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**THE ROLE OF INTERACTIVE NETWORKS IN THE CREATION AND GROWTH
OF ACCELERATOR-STARTUPS**

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ABSTRACT

The business accelerator has been a rising organizational model from the last two decades onward. As a subcategory of business incubators, these organizations assist startup potentials in the actualization, creation, and development of business ideas by providing access to mentors, seed funding, technical support, among others. They facilitate the young company in achieving greater economies of scale and higher likelihoods of survival than should the new firm attempt to rise on its own. However, the long-term benefits of accelerator presence are uncertain.

There are many aspects of accelerators, which may affect the startup outcome. The purpose of this research is then to analyze the possible influence of interactive networks on startup success. Studies in this regard have been somewhat scarce. The research commences by assessing the formation of the networked incubator, the entry of the accelerator and program process, the composition of social architecture and social network structures, startup development, and network influences on the startup. Additionally, there is a focus on the means through which information and resources spread via knowledge sources. The theoretical goals established in attaining the purpose are to evaluate the growing importance of accelerators in the current business setting regarding startups, the possibility of institutionalizing a socially interactive network as a component of the business accelerator program (BAP), and the advantages of participating in a BAP from the new venture point of view. Of the empirical goals, social network elements, such as the actors (mentors, investors, former startups, international accelerator members), frequency of meetings between these actors and startups, events, and international quality are measured against startup outcome.

A quantitative analysis was performed, and data were collected via an online survey filled and returned by accelerator representatives. The study was limited to accelerators located in the regions of North America, Europe, and North Africa and the Middle East (MENA). A total of 35 samples was generated: 13 North American, 18 European, and 4 MENA accelerator responses. A regression model was utilized, and possible direct and indirect effects of accelerator network actors, the involvement of these individuals with startup teams, accelerator events, and international connections on startup development were assessed. The results demonstrate that events linking startups to support members as well as the frequency of meetings between former startup members and current startup members exhibit the most significance of the network features tested. This turnout then presents some implications for accelerator management in the future.

KEYWORDS: business accelerator, business incubator, social capital, interactive networks, social networks, startups

I. INTRODUCTION

Past episodes in economic history have experienced respective dominant organizational models, from the mass production model of the early 20th century, to the multidivisional companies of the 1920s, conglomerate companies of the '60s, and leveraged buyouts and venture capitalists of the '80s (Hansen, Chesbrough, Nohria & Sull 2000). However, the last twenty years has seen the rise of the business incubator, entities that promote the growth of entrepreneurial companies and thereby regional economic development (Grimaldi & Grandi 2005). Soon after followed the emergence of the seed accelerator, a concept stemming from that of the traditional incubator, though the two entities have differing characteristics. Much emphasis has then been placed on the value created by the interaction of incubators or accelerators and their respective startup mentees. In addition, the role of human capital in the network formation of incubators has been of great interest (Tötterman & Stein 2005; Wu 2011).

This introductory section covers the background and importance of the study, identifies the research problem, explicates the research gap, and delineates definitions of key terms pertaining to the research. In addition, the scope and limitations are examined and the outline of the study is explained.

1.1 Relevance and purpose of the study

During the growth phase of a startup, the entrepreneurial unit may apply to undertake a business incubator or accelerator program in order to gain leverage under the auspices of a managerially experienced organization. Should the application be accepted, the incubator offers a range of services that encompasses technological support, proliferation through marketing, linkages to human capital and financial capital, administrative equipment and services, and legal aid, among other specialized provisions (Hansen et al. 2000; Lyons 2002; Peters, Rice & Sundararajan 2004; Grimaldi & Grandi 2005; Tötterman & Stein 2005; Aaboen 2009).

Additionally, with the ever-increasing occurrence of internationalization, several aspects of societal institutions and organizations emerge, and the world essentially becomes a social

arena in which human relationships inevitably develop. These social networks then become the underlying source that enables these organizations to function (McGrew, 1992), as well as becoming key facilitators in knowledge sharing and transfer (Cross, Liedtka & Weiss, 2005; Tötterman & Stein 2005). These conditions then formulate the need to recognize the importance of social architecture in the field of business administration (Perlmutter, 1991).

There is evidence that networked incubators exert some influence on the startup, such as connections to partners (Hansen et al. 2000). The beneficial effects of startup accelerators, however, are yet to be known (Wu 2011, Carr 2012). Therefore, it is necessary to assess the advantages of accelerators for startups, should any exist, as well as examine the role of social networks on the development of startup companies.

The purpose of the study is to examine the extent to which social contacts may aid entrepreneurial units in the emerging process. Specifically, the role of accelerator networks in the rise of start-up companies will be analyzed. Additionally, the geographical areas of focus for the study are in the North American, European, and Middle Eastern and North African regions. An explanation for these choice regions of research are presented in Section 2.1.1 Seed funding history and current situation of incubation.

The research question is as follows:

Do accelerators' networks play a role in the creation and survival of start-ups? If so, how?

In attempt to answer the research question, objective questions have been established in order to first ascertain the influential characteristics the startup accelerator network may have:

- 1) Why are accelerators exhibiting a large and ever-growing presence in the global business arena?
- 2) Should networks be instituted in a business accelerator program (BAP), what interactive actors and dimensions may contribute benefits towards the startup? Additionally, which benefits may be present?

3) How do accelerator networks located in the three regions of North America, Europe and the Middle East and North Africa (MENA) compare when considering network interactions and startup success rates?

These objectives are posited as preliminary goals in attempt to answer the research question. The first objective is presented in order to gauge the relevance of accelerators in the modern business setting. The second objective is then put forth to reveal the advantageous features of accelerator assistance towards young growing companies. As the scope of the study (discussed later in this chapter) is limited to three regions of focus, the third objective is an empirical goal to be demonstrated by the research results. From the interpreted findings, the extent to which the results can be generalized to accelerator networks and startups in other regions will be determined. Further empirical goals are explained in the third chapter of the study and discussed in accordance with achieving the theoretical objectives presented above.

1.2 Research gap

There has been much literary discussion on the positive affect that incubators have on the growth process of startups, however, the literature is scarce where accelerators are concerned (Hansen et al. 2000, Wu 2011, Needleman & Maltby 2012). In regard to the questionable presence or lack of benefits concerning the startup-accelerator, the effect of a social capital component of the accelerator on entrepreneurial enterprises is additionally less prevalent. There has, nevertheless, been considerable attention paid to social capital as a key element in business incubation as determined by Hansen et al. 2000; Tötterman and Stein 2005; Hughes, Ireland and Morgan 2007; and Bergek and Norrman 2008, among others. Though there is a substantial body of evidence regarding the benefits for the startup in participating in a business incubation program, the networks involved are usually those of experienced companies (Hansen et al. 2000), and do not elucidate so much the importance of certain social elements (Tötterman & Stein 2005), such as other incubatees in another geographic branch of the same incubator, participants in events, such as a demonstration day for startups, and others that may involve potential stakeholders.

Graduating from a business incubator or accelerator program alone does not guarantee success for the future of the company (Lumpkin & Ireland 1988; Bøllingtoft & Ulhøi 2005; Hughes, Ireland & Morgan 2007; Scilitoe & Chakrabarti 2010), and there is a need for more data from program completions to be collected over time in order to assess value-creating factors. Tötterman and Stein (2005) note that more studies should focus on contact networks as a highly pertinent contending component of entrepreneurial growth and not only those that observe other provisional resources, such as facilities, financial capital, and other similar tangible support. Scilitoe and Chakrabarti (2010) additionally note that analyses should be undertaken in determining those network characteristics that aid in entrepreneurial development. Moreover, in addition to the lack of studies focused on the accelerator network (Hansen et al. 2000), however rather in abundance regarding the incubator network, the research is even scarce concerning a comparison of accelerator networks specific to region (Mian 1997; Scilitoe & Chakrabarti 2010). Here, those of North America, Europe, and the Middle East and North Africa will be the regions of focus.

1.3 Key definitions

For the purpose of this thesis, several key terms have been delineated and/or condensed in order to elucidate the relevance to the study. Further explication of the following concepts is presented in the theoretical settings.

Several authors have explained the definition of the *business incubator*. In essence, incubators are organizations that assist new enterprises in their foundation and development in order to fulfill an economic objective. In addition to providing seed funding for technology-based firms, these organizations supply a wealth of provisions, which include, but are not limited to, office facilities, accounting, insurance, employee benefits, legal counsel and mentorships (Bergek & Norrman 2008; Hansen et al. 2000; Scilitoe & Chakrabarti 2010). According to Bøllingtoft and Ulhøi (2005), a business incubator, or BI, is an umbrella concept for any organizational unit that provides the necessary services in order to facilitate the establishment, development, and future success of an entrepreneurial enterprise. There exists an endless slew of epithets referring to the BI concept that have been coined by various authors, such as ‘seed accelerator’, ‘boot camp’, ‘research park’, ‘innovation center’, etc.

(Hansen et al. 2000; Bøllingtoft & Uhløi 2005; Becker & Gassmann 2006; Scilitoe & Chakrabarti 2010).

The *networked incubator* is a hybrid form of the incubator, and this organization increases the likelihood for startup success (defined in section 2.1.4 the business accelerator) than does the non-networked incubator. The networked incubator is equipped with the workings and potential collaborative partners to provide startup management with adequate tools to leverage and enhance the ebb and flow of knowledge and talent (Bøllingtoft & Uhløi 2005; Hansen et al. 2000). For this research, the idea of the networked incubator will be used as a basis to conceptualize an idea of the ‘networked accelerator’.

Networks for the context of this study refers to *network structures, interactive networks, social contacts, social capital, social networks, personal relations, business or interorganizational networks* and encompasses a whole slew of terms that refer to individual human interaction and the benefits to be achieved from such connections. Networks and its structural like may be considered as the ties connecting individuals together, where social capital may be depicted as the benefits or value-enhancing qualities stemming from the connections. Nonetheless, the two terms are often used in conjunction or synonymously (Putnam 2001). The following Table 1 explicates some of the descriptions various authors have attributed to the concepts of networks and social capital, respectively.

Table 1. Descriptions of networks and social capital

Network	“a set of actors connected by ties”	Granovetter (1973)
	“a set of individuals and the relationships among them”	Fombrun (1982); Grandori & Soda (1995); Coviello & Cox (2007); Santos & Barrett (2007)
	in regards to an exchange perspective, a relationship in which a resultant exchange of tangible (e.g. material) or intangible (e.g. knowledge) value occurs	Cook & Whitmeyer (1992)
	connections made among actors based upon psychological, geographical, or physical similarity	McPherson, Smith-lovin & Cook (2001); Reagans (2011)
	interorganizational relationships represented by individuals	Provan, Fish & Sydow (2007)
	access to resources or intermediaries in the position to provide such needs with or without regard to financial compensation	Peters, Rice & Sundararajan (2004)
	a framework consisting of “nodes, which are also called social actors” and connected by “social links” and characterized by a common purpose and behavior	El Toukhy, Safar & Mahdi (2011)
Social Capital	any value-producing feature that arises from a social formation and that benefits the individuals in the social relationship	Coleman (1990); Molloy (2005)
	“a system of relationships between and among individuals in a social network”, in which the underlying framework is built upon trust and expectations to fulfill obligations	Lyons (2000); Coleman (1988)
	comprised of networks and norms of trust and cooperation	Putnam (2000); Patulny & Svendsen (2007)
	linkage of individuals by mutual trust and communication; the ‘goodwill’ or ‘benefit’ stemming from the relationship	Nahapiet & Ghoshal (1998); Adler & Kwon (2002); Scilitoe & Chakrabarti (2009)
	the embodiment of social relationships and their contribution to resources	Tsai & Ghoshal (1998)
	collective ties in which participating individuals have the possibility of accessing information and resources	Bøllingtoft & Ulhøi (2005)
	“a body of goodwill [or] a ‘credential’ that is developed by an actor”	Hughes et al. (2007)

Accelerators are a subgroup of incubators. There has been no formal definition given to the concept, rather it seems that meanings have been assigned to the term relative to the characteristics of business incubators. Miller and Bound (2011) note business accelerators as demonstrating five main characteristics, among others, and illustrated in Table 2.

Table 2. Five principal characteristics of an accelerator (Adapted from Miller & Bound 2011)

- | |
|---|
| <ul style="list-style-type: none"> • Application cycle that is accessible by anyone, however highly selective • Allotment of seed funding to startup, generally in exchange for equity • Small teams rather than individual entrepreneurs • Relatively short period of incubation consisting of in-depth counseling and supervision • Each acceleration cycle is represented by ‘batches’ or ‘classes’ of firms, in which there is simultaneously occurring investment |
|---|

For the purpose of this research, the terms *incubator* and *accelerator* can be used interchangeably in the following manner. As accelerators are a category of incubators (Grimaldi & Grandi 2005), when referring to incubators in this study, accelerators are generally included. However, when utilizing the term *accelerator*, this usage will refer to the differentiated concept delineated more in detail in the theoretical settings and listed in Table 5. Incubators vs. Accelerators (in Section 2.1.3 Incubators vs. accelerators).

A *startup*, or *start-up*, is described as the embodiment of a new firm or entrepreneurial establishment (Mazzarol, Volery, Doss & Thein 1999). In the context of this study, the startup entrepreneur is in need of resources and seeks assistance and expertise from an incubator or accelerator in order to establish the firm and/or fuel the growth of the fledgling company. Additionally, this entrepreneurial unit is attempting to dispense an innovative product or service in an unpredictable environment and seeks to overcome a ‘liability of newness’ (Bøllingtoft & Ulhøi 2005; Tötterman & Stein 2005).

These terms are delineated in order to achieve the purpose of the study. In the context of the research, the incubator and its subcategory, the accelerator, will be differentiated, as the

accelerator is the organizational unit of focus here. The individuals comprising the accelerators' social web alongside the accelerator management are the network members, another pivotal concept. Furthermore, the startup team is the very individuals participating in the BAP. Social capital is then the product of the network connections between the accelerator and the startups, as well as the element that is derived from each network actor in contributing to startup success.

1.4 Scope and limitations of the study

The research focuses on accelerators located in the regions of North America, Europe, and the Middle East and North Africa (MENA). It also concerns the interactive networks, in which accelerators connect to their startup teams. The study is undertaken from the perspective of the accelerator. As the point of view from the startup is not taken into consideration, there may yield diverging results should a study compare the differing viewpoints. In addition, interpersonal and intrapersonal network connections between and among individuals and group clusters are difficult to gauge, as there are many facets to consider when attempting to pinpoint network characteristics, such as internal vs. external, collective vs. individualistic, dynamic vs. static, etc (Tötterman & Stein 2005). The purpose of this study is then to focus on the network structure from the point of view of the main actors, i.e. analyzing social configurations as best as can be deciphered from the perspective of the accelerator. There are also several models of incubation, one among which is the accelerator (Grimaldi & Grandi 2005). As such, they will not be thoroughly discussed, as the focus is primarily on the accelerator. Furthermore, the objective of the study is not to analyze or present theories regarding 'best practices', however, suggestions for interactional improvements may arise should research yield positive results.

1.5 Structure of the study

The study is outlined in five parts. Following this introductory section are the theoretical settings, research methodology, empirical research and findings, and discussion and conclusion. A quantitative research and data collection method will be utilized, which will be described further in the research methodology chapter of the thesis.

The subsequent second chapter covers the rising impact of incubation on startup companies, a brief history of incubation origins, the role and composition of the networked incubator, the components and aspects of interactive networks and social capital, and knowledge and information sharing via these networks. The theoretical portion of this study concludes with a presentation of the theoretical summary, as well as the hypotheses to be tested in the subsequent research and empirical findings chapters. The hypotheses surmise the roles of accelerator network aspects on the startup outcome.

The third chapter of this research report concerns the methodology utilized in conducting the study. The research elements include the philosophical approach, the quantitative method, and survey design utilized. Here, the reliability and validity of the research is also discussed.

The empirical study and findings chapter elucidates the results generated via a regression analysis. The findings are explained through the direct and indirect effects yielded from sample observations. Additionally, implications regarding the limitations of the research are presented.

The final chapter explicates a summary and notable findings along with study limitations and future research suggestions.

2. THEORETICAL SETTINGS

This theoretical settings chapter of the thesis will lay out the foundation of the research. Here, the individual component concepts of the incubator, the interactive network, the accelerator, the startup, and their correlating relationships will be explicated and interwoven in order to demonstrate the theoretical basis. The structure commences with the rising presence of business incubators, the evolution of the incubator to encompass a broad range of differing types, including accelerators, the involvement of social networks with the incubator, elucidation regarding the network structure, and networked incubation and acceleration with the startup.

These theoretical concepts are detailed in attempt to achieve the empirical objectives described throughout the chapter, and elaborated in chapter three. The strengthening role of incubators is explicated in order to exemplify the relevance of such organizations in the modern business realm, and the networked incubator is discussed in order to explain the position of business accelerators in the incubation context. Social networks are described for the purposes of this research, as the concept is broad, and definitions are required in order to establish a context for the study. Categories of social capital are presented to discuss the non-tangible benefits of network connections, and network dimensions will be the framework upon which measurements are extracted in the empirical research design. Network dimensions and structures are developed as determinants for network elements and actor involvement, which are measurable features by accelerator management toward the startup. Lastly, knowledge sharing via social structures as a form of social capital is also a measurable factor, from which effects are visible by accelerator personnel.

2.1 Emerging role of incubators

In this section of the theoretical chapter, the prevalence of the business incubator, or BI, will be explained from an historical aspect. Therefore, the following discourse concerns traditional types of fund and assistance providers to the entrepreneur preceding the rise of incubation; the history of the BI, its respective categories and services; the accelerator; and the networked incubator as a precursor to the idea of the networked accelerator. According to Coase (1992) and Williamson (2002), a failure in the business market essentially exists, as

current entrepreneurs, who should ideally have business expertise when forming a new venture, are lacking such skills. It then falls upon these new managers to contract these skills to other units and organizations. Hence, the incubator has witnessed a rise in prevalence over the years to fulfill these new market needs. The subsequent elaboration of the functions of incubation, as well as the breakdown of incubator types, is necessary to position the role of the accelerator. Additionally, meaningful elements in regard to accelerator management will be assessed and predictor variables for the purposes of the study will be extracted from this portion of the theory.

2.1.1 Seed funding history and current situation of incubation

Startups, new companies that are generally small in size, typically hold few of their own assets and face a variety of other challenges while attempting to establish themselves (Gompers & Lerner 2001; Keuschnigg 2004). Zider (1998) notes that the need then arises to collaborate with a resourceful partner in order to overcome financial hurdles and garner professional experience. Traditional modes of obtaining assistance in order to achieve funding and growth for innovative startups has been, among others, via bank loans, support from corporations, the government, academic institutions, venture capitalists, business angels, or wealthy patrons. These sources of aid fuel research and development initiatives. Corporate assistance, nonetheless, may only go as far as the organization's objectives, and remuneration for individual or team effort amongst a group of employees is often complicated. Funding obtained from universities may conjunctionally be government-backed, and the resulting fruition may be patent protected afterwards, as well as contribute to economic growth (Zider 1998; Becker & Gassmann 2006; Fishback, Gulbranson, Litan, Mitchell & Porzig 2007; Miller & Bound 2011).

Venture capitalists play a pivotal role for startups in the generation of innovation and value-added production. However, there are time constraints concerning involvement in such partnerships, as large amounts of funding and skill development are considered before heavily investing in an entrepreneurial unit (Gompers & Lerner 2001; Keuschnigg 2004). Additionally, venture capitalists often invest large sums of money into a worthwhile newfound business, and are perhaps keen to provide capital assistance to entrepreneurs during the later stages of the growth process, as the initial stages are comparatively risky. On

the other hand, ‘Love money’, or finances contributed by loved ones or personally close individuals are often not enough to support the growth of a startup in the long-term perspective. Therefore, business angels close the rift in this wide spectrum, and may fill the void during the early phases of startup initiation, or until the new firm reaches a venture capital phase in the future (Ibrahim 2008). These differing modes of entrepreneurial assistance are depicted in Figure 1. From this figure, the differing types of assisting organizations are exhibited. These foundations are broad and varied, with the incubator also serving as a contender in this industry.

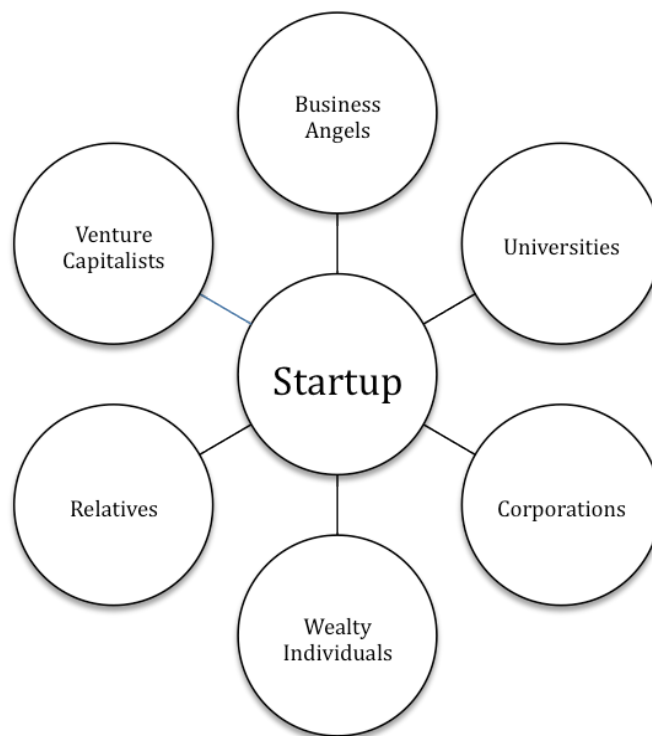


Figure 1. Differing types of sources for startup assistance (Adapted from Zider 1998, Becker & Gassmann 2006, Ibrahim 2008)

The business incubator began to surface during the 1960s, and academic literature on the topic followed circa two decades thereafter when the number of incubating organizations began to rise dramatically (Hackett & Dilts 2004; *NBIA* 2009). The term ‘business incubator’ was first coined upon the first instance of its existence in the 1950s in Batavia, NY. An individual by the name of Joseph Mancuso was in possession of a large abandoned property, which he would lease to outside businesses and facilitate in the raising of funds and offering consultations. Among the first tenants of the Batavia Industrial Center, or the first known BI,

included a chicken enterprise, leaving behind the legacy of the ‘incubator’ (Sherman 1999; *NBIA*, 2009).

Since then, there has been an explosive growth in the number of incubating organizations globally in recent years. The National Business Incubation Association (NBIA) projects that there approximately 7,000 incubators worldwide as of 2009. Pertaining to the focus of this study, development in the field of incubators is briefly explained concerning BIs in North America, Europe, and the MENA areas. As of 2004, Peters, Rice and Sundararajan mention in their study, where the number of incubators was nearly 900 in the early 2000s, these several hundred incubating organizations became obsolete following the burst of the dotcom bubble. As of 2012, there are over 1,250 incubators in the US alone (Richards 2002; Vasil 2003; Peters, Rice & Sundararajan 2004; *NBIA* 2009).

In Europe, the incubation wave arrived in the UK in the 1970s and more widely in Europe in the 1980s. Business leaders utilized the incubation approach in attempt to achieve economies of scale in an era of economic volatility, as the “controlled environment” of incubators enhanced the longevity and sustainability of new firms. Several incubating organizations then began to take shape across Western Europe in the forms of technology parks, innovation centers, and the like, as funding expanded from government to private institutions (Rhyzhonkov 2013). Finland, is currently listed as one of the world’s highest ranking globally competitive countries (*World Economic Forum*, 2013). Startups strive to realize innovation and ICT through several offered BAPs along with a rising presence of not only new ventures, but also accelerator programs themselves (*Vigo*, 2012). In Italy, programs and events for startups are on the rise as well. Traditionally discouraged by law as to the amount of seed funding new businesses can receive, government-funded programs via accelerators now encourage the establishment of companies in communication, technology, and other related fields (Rizzo, 2013).

In the Middle East and North African region, there have been some lengths to establish a coordinated ‘national system of innovation’ and to align science and technology initiatives with economic development (Djeflat 2002). In addition, entrepreneurship has generally been sparse in this area, and employment and thereby economic growth has been a key objective of the region (O’Sullivan, Rey & Galvez 2011). Thus, BIs have become a means of promoting and encouraging innovative initiatives in the MENA area in the last two decades. For

instance, the Egypt Incubator Program (EIP) was launched in the 90s, and since then, facilities have risen in the country, as well as in Tunisia, Lebanon, and other notable locations of the region as well (Djefflat 2002).

Business locations elsewhere in the world were also witness to incubation. BIs in Australia, Latin America, and Asia emerged in the 70s and 80s and have also generated several classes of entrepreneur graduates. These incubatees have contributed to the job growth of their respective economies as well as an outpouring of innovative development (Nunberger, 2013). Entrepreneurs may choose to undergo a business incubation program for a number of reasons. In addition to the resources and assistance BIs provide, incubation programs are more custom-tailored to suit individual tenant needs than traditional modes of startup assistance, such as venture capitalists and corporate sponsors (Vasil 2003). (Resources and services are explained later in Section 2.1.5 BI services and other implications of the incubator.) BIs are on the cutting edge of the technology industry, as members of these organizations are up-to-date on the latest technological advances and developments. Thus, the BI is a likely candidate in actualizing the innovative potential and ideas of startups. The capability of the BI to tend to the objectives of each incubating firm not only results from the environment, in which there exists the provision of services, but also from the network of actors that BIs introduce to startups (Peters, Rice & Sundararajan 2004; McAdam & McAdam 2008; Aaboen 2009).

In addition to minimizing the chance of new business failure, incubators contribute to the economic growth of a country or region by enriching knowledge and technological advances via bolstering promising talent of entrepreneurs (Scilitoe & Chakrabarti 2010; Mian 1997; Grimaldi & Grandi 2005; *NBIA* 2009). In the last decade, BIs have been responsible for a wealth of job growth and innovative outpouring, particularly among technology-based firms (Peters et al. 2004).

During the first generation of incubation (incubation generations are elaborated in Section 2.2.2 Accelerators and the social structure), incubating organizations were mainly a method of stabilizing the economy. As such, much of the resultant funding was backed by local and national governments (Bruneel et al. 2012; Ryzhonkov 2013). In addition to the governmental organization, incubators are funded by universities, economic development

centers, a fusion of two or more of the above organizations, for-profit organizations, donors, or have no sponsor (*NBLA*, 2009).

2.1.2 The business incubator

As the original goals of the sponsoring institution and that of the startup are oftentimes inconsistent with each other (Hacket & Dilts 2004; Scilitoe & Chakrabarti 2010), the need then arises for assistance and resources offered by the incubator to be customized to fit the specific needs of the entrepreneurial enterprise (Lyons 2002; Grimaldi & Grandi 2005; Tötterman & Stein 2005). Thus, the business incubator has become a broad concept that encompasses a wide variety of organizations, each tailoring their services to the industry, in which the founding firm is located (Aernoudt 2004; Scilitoe & Chakrabarti 2010).

The BI is generally difficult to define, as the academic literature available on the topic is quite splintered regarding the various classifications authors have chosen to categorize incubators (Hughes et al. 2007). Additionally, features of the BI may also vary according to the perspective with which academics choose to apply a definition. Though a brief description of the BI is given in the introduction chapter, the following Table 3 elucidates some of the varying explanations presented by academics. The basis of this study will utilize these specific explications as the underlying definition for the incubator.

Table 3. Various authors' descriptions of the business incubator

a business unit that facilitates fledgling firms towards development into a competitive enterprise and that "offer[s] opportunities for collaboration"	Hughes et al. (2007)
an organization that connects "skills, technology, capital and know-how to leverage entrepreneurial talent and accelerate a firm's development"	Huges et al. (2007); Smilor (1987); Mian (1997)
a facility that provides office space; seed funding; business, governance, and management services; has a limited time period for tenant occupancy; and may be connected to a tertiary institution	Vasil (2003)
"brokers" who are either for-profit, non-profit, or university-based mediating entities that supply basic startup needs, such as infrastructure, mentoring, and networking	Peters, Rice & Sundararajan (2004)
organizations whose primary goal is entrepreneurial establishment by providing a customized scheme to suit the individual needs of the new firm	Richards (2002), Vasil (2003)
instruments of introducing innovation and a means to commercialize successful outcomes	Aaboen (2009)
"a business support process" that enhances the growth of new companies by supplying "resources and services ...management guidance, technical assistance and consulting tailored to [these] young growing companies"	(NBIA, 2009)

Potential incubatees undergo an *application* and then *selection* process prior or subsequent to formulation of the business concept. Individual BIs may have their own selection criteria, as these phases are highly competitive, often comprising a substantially greater number of applications than those admitted (Hackett & Dilts 2004; Becker & Gassmann 2006; Bergek & Norman 2008). The *structuring* phase consists of the financial compensation agreement for services rendered by the incubator and other administrative details. Equity (around 20% in for-profit incubators and 5% in non-profit) or fee payment are usually accepted as media of exchange. The *involvement* stage is the longest and most in-depth of the phases, as incubatees become integrated with incubator management, mentors, and support from peers. This phase is perhaps the defining moment for interactive network formation and the socialization process. The incubator also conducts the monitoring of activities. Finally, the exit stage is

signified by completion of the incubation program, in which there is a follow-up on the achievement, or lack thereof, of objectives. Additionally, features focused upon are graduation rate, particularly pertaining to the ratio of the number of tenants to the size of the incubator, as well as profit generation (Hackett & Dilts 2004; Becker & Gassmann 2006). A diagram of the incubation lifecycle is depicted in Figure 2.

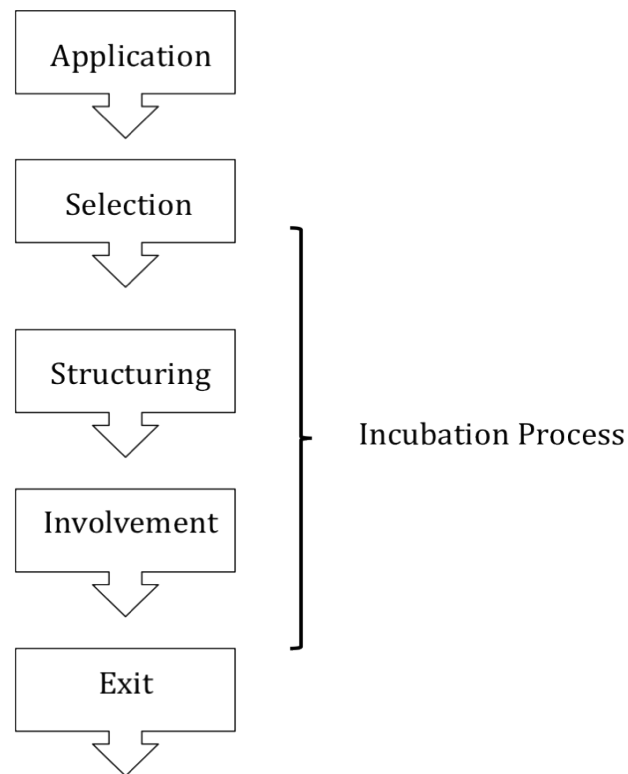


Figure 2. Phases of Incubation from the BI point of view (Adpated from Hackett & Dilts 2004, Becker & Gassmann 2006)

Though the differing actors, mentioned in the sources for startup assistance who may assist entrepreneurs, are the area of focus prior to the emergence of incubators, these facilitating individuals are not necessarily independent of the incubation process. Angel investors and venture capitalists may engage with the startup upon completion of the acceleration process (Miller & Bound 2011).

2.1.3 Incubators vs. accelerators

As mentioned in the previous section, some difficulty is presented in the attempt to classify incubator types, as such, categorization methods are broad and varied. They may be grouped according, but not limited to, determinants of success (Bøllingtoft & Uhløi 2005); by differing combinations of resource distribution and knowledge transmission (Hughes et al. 2007); by for-profit or non-profit (Becker & Gassmann 2006); by incubator affiliation, i.e. private, public, government, university; and by type of incubatee, i.e. startup or spin-off (Hackett & Dilts 2004). Some of the taxonomies extracted from incubator literature are described below. These classifications were chosen, in particular to delineate some of the pervasive elements of incubation programs described by academics.

BIs have been predominantly manifested in two categories in regards to the definition of success. In the first instance, incubators provide the entrepreneurial unit with access to office space. Here, startup ‘success’ is determined by the ability of the entrepreneur to meet periodic payments demanded by the use of the facilities. In the second case, the new enterprise is supplied with resources by the incubator in hopes that the young company’s future yields would exceed that of the initial assets. ‘Success’ in this instance is demonstrated by the firm to hold its own post-incubation and survive independently thereafter (Bøllingtoft & Uhløi 2005).

Hughes et al. (2007) posit that the differing mixed levels of resource pooling and knowledge sharing exercised by incubators also determine their classification of the incubation process as specialized, enclosed, dynamic, or community incubation. Specialized incubation implies the focus on the leveraging of resources over knowledge-seeking behavior. Enclosed incubation stipulates that neither strategic network involvement nor resource pooling are the priority of the incubation process. Dynamic incubation involves the firm utilizing the maximum potential of networks and resource gathering. Thus, this may be the category of incubation towards which organizations should strive. The community incubating process prefers the access of knowledge via strategic networking relative to the garnering of resources. Constructed by Hughes et al. (2007), the following value matrix Figure 3 demonstrates the value potential in relation to the differing types of incubation processes.

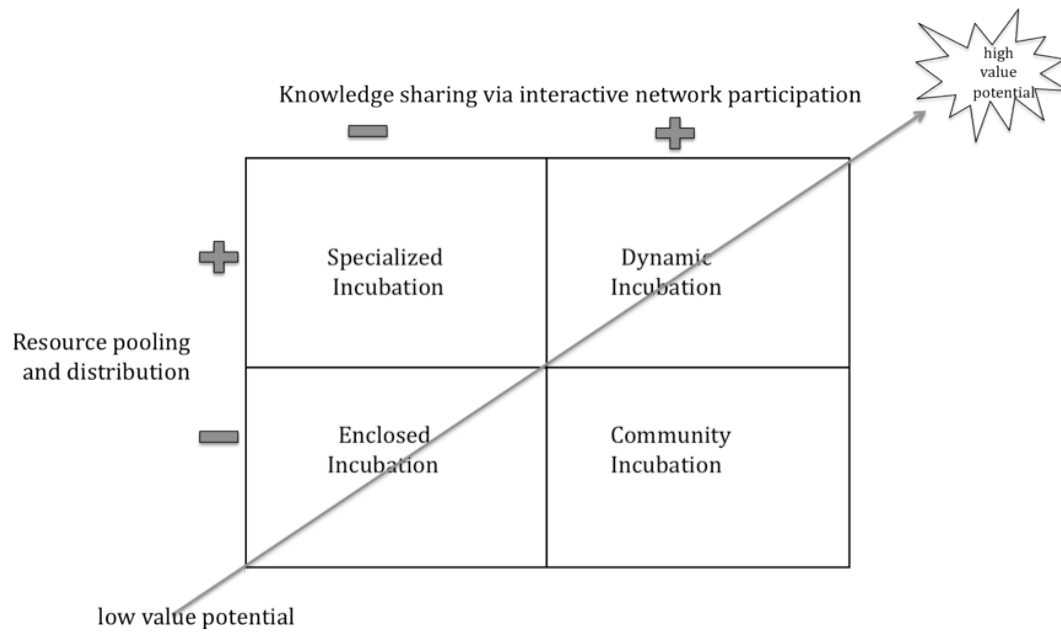


Figure 3. Potential for value creation in the context of incubation (Adapted from Hughes et al. 2007)

For-profit and non-profit incubators are also classification properties and additionally have their respective contributions to society. For instance, non-profit may target regional development and assist startups requiring small amounts of capital. For-profit, on the other hand, may generally target innovative and enthusiastic technology advancement in the rapidly changing environment (Grimaldi & Grandi 2005). The networked incubator generally refers to for-profit incubators (Bøllingtoft & Uihøi 2005).

In the same vein, public incubators receive financial returns from payments for their services and public funding. Where private incubators implement service fees, a percentage of revenues from incubatees is also extracted. Grimaldi and Grandi (2005) further comment on the features distinguishing public and private incubators, as exhibited in the following Table 4. The incubators contacted for this specific research are for-profit organizations.

Table 4. General distinguishing features between for-profit and non-profit incubators (Adapted from Grimaldi & Grandi 2005)

	For-profit	Non-profit
Mission	profit generation	local and regional development
Industry	specific or relating to high-tech	generic or relating to research
Physical location	industrial(ized) areas	vicinity of university or revitalized area
Market	national/international	regional/national
Source of ideas	most likely externally originated	most likely internally originated
Phase of intervention	typically from the early to exit phases	typically in the early phases
Duration of incubation period	medium to long term	medium to short term
Financial compensation	service fees and equity	public funding
Management	directly involved with incubatees	serve as intermediaries between entrepreneurs and their goals

For the purposes of visualizing the accelerator amongst incubator categories, Grimaldi and Grandi (2005) identify four types of business incubators: business innovation centers (BICs), university business incubators (UBIs), independent private incubators (IPIs), and corporate private incubators (CPIs). The authors additionally note that accelerators fall into the classification of independent private incubators. It is argued that BICs follow the mode of traditional incubator programs, i.e. providing tangible provisions to tenants. The latter two types of incubators indicate a penchant towards in-depth entrepreneurial engagement and facilitation in the achievement of objectives. In this way, IPIs and CPIs are also characterized by their networking propensity, i.e. the formation of collaborations for the purposes of fulfilling common objectives in addition to transmitting knowledge, skills, and other learning resources (Grimaldi & Grandi 2005; Hansen et al. 2000; Lee & Jones 2008). The taxonomy is depicted in the following Figure 4.

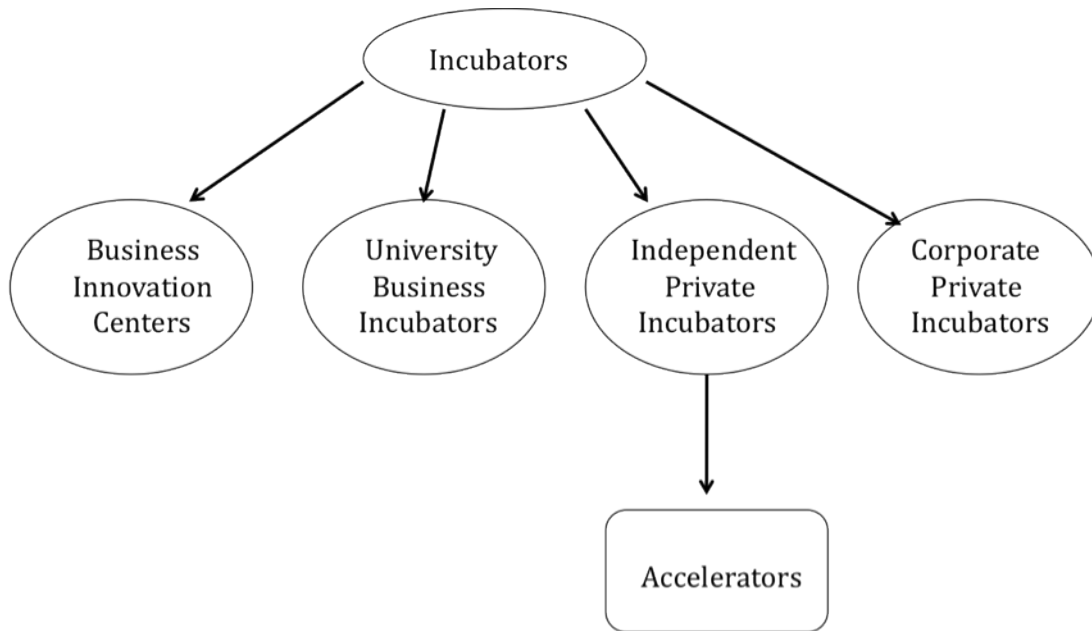


Figure 4. Accelerators as a subgroup of incubators (Adapted from Grimaldi & Grandi 2005)

The acceleration cycle also differs somewhat from the incubation cycle. For example, accelerators generally might not engage with the tenant during the origin of the business idea, but rather when the entrepreneurial unit has established the business concept and requires capital and technical assistance or informational resources (Grimaldi & Grandi 2005). Incubators, on the other hand, may engage with the new firm from the onset of the business idea. Additionally, where upon completion of an incubator program the incubator continues to offer support (Beckers & Gassmann 2006), accelerators take a more independent stance towards their graduates (Wu 2011). Furthermore, the following Table 5 elucidates some of the key differences between the two organization types.

Table 5. Incubators vs. Accelerators (Sources: Vasil 2003, Fishback et al. 2007; NBIA 2009; Miller & Bound 2011; Wu 2011; Kopytoff 2012, Morrow 2012; Tozzi 2011; Needleman & Maltby 2012; Isabelle 2013)

descriptor	Incubators	Accelerators
<i>incubation period</i>	1-5 years	around 12 weeks
<i>facilities offered</i>	permanent space	temporary space
<i>industry</i>	wide spectrum	web or app-based technology
<i>services</i>	periodical	intensive and continuous
<i>entrepreneur type</i>	previous business experience, older programs	young and technologically inclined, newer establishments
<i>prevalence</i>	from the late 1950s onward	from 1990s onward
<i>applicant type</i>	teams and/or individuals	small teams/ classes
<i>time to market</i>	relatively long	relatively short
<i>type of program</i>	an institution	within an institution
<i>profit orientation</i>	non-profit or for-profit	typically for-profit
<i>focus</i>	generally towards economic growth	generally towards business growth and return on investment
<i>startup stage</i>	early stage	next stage, high-growth
<i>time projection for startup</i>	long-term sustainability	short-term, cohort-based

2.1.4 The business accelerator

There are nearly 200 plus and growing active accelerator programs around the world as of today, numbering around 80 in North America, 50 in Europe, 30 in the MENA region with many others located in Australia, Asia, South Africa and elsewhere (Needleman & Maltby 2012; Christiansen, 2013). Additionally, there are approximately 50 members in the Global Accelerator Network (GAN). Like the business incubator, the accelerator offers startup assistance, seed funding, management and technical advice, and other assistance relating to

business functions, such as in marketing and distribution (Vasil 2003). Seed funding provided by the accelerator to the startup is, in fact, “minimal”, particularly in comparison to the wealth of other provisions supplied to the new firm (Chahal 2013). According to Fishback et al. (2007), the accelerator is an in-depth collaborative partnership. Unlike the typical incubator which essentially “is a real estate deal, with start-ups as tenants who pay for shared overhead”, the accelerator becomes fully integrated with the entrepreneurial unit. A management team is instituted at the start of the incubation period and assists with the business processes of the new firm, although at any given time, this team may be collaborating with many other startup tenants in the same batch or class.

As described in Table 2. Five principal characteristics of an accelerator (in Section 1.3 Key definitions) and Table 5 Incubators vs. Accelerators (in Section 2.1.3 Incubators vs. accelerators), there are some defining features of accelerators that should be elaborated upon. Accelerators have shown prevalence since the 1990s, where incubators surfaced nearly half a century ago (Kopytoff 2012). A highly competitive web-based application cycle is implemented in order to select those teams demonstrating innovative potential. The more well known the accelerator program, the lower the acceptance rate of applicants. Seed funding in exchange for equity is usually provided to startup teams to cover basic program costs and for a short duration thereafter (Miller & Bound 2011; Tozzi 2011; Needleman & Maltby 2012; Chahal 2013). Small teams are preferred over individual entrepreneurs, as an individual would carry the burden of labor and responsibility of a sole proprietor. Additionally, large teams incur great amounts of investment costs. The acceleration period usually lasts between three months to half a year due to the rapidly changing environment requiring the attainment of quick results (Miller & Bound 2011; Needleman & Maltby 2012; Kopytoff 2012). One of the key determinants of success under an accelerator program is the capability of the startup to survive post-graduation (Wu 2011). Furthermore, accelerators typically support start-ups in the same industry, usually tech-based (Fishback et al. 2007). Some accelerator programs are also oriented towards population minorities, e.g. based on gender or race or ethnic background, in order to encourage entrepreneurial efforts amongst those who have not traditionally done so (Morrow 2012).

Miller and Bound (2011) have noted the ever growing progress towards achieving economies of scale while participating in an accelerator program. Setup costs have minimized, as software and hardware have improved and evolved. Many activities can be performed via the

computer, the Internet, online social networking, web-based applications, or other virtual means. Licensing costs have reduced over time as well, allowing access to a broad range of media. Acquisition costs have also decreased, and social platforms have allowed for greater feasibility for acquisition than in the past. Moreover, methods of payment have advanced, creating huge involvement in online trading and commerce. For instance, shopping carts, online payment platforms, and web-based applications have resulted in a greater awareness and experience in usage than a decade or more ago during the dotcom era (Miller & Bound 2011).

Contrary to the general trait of incubation to minimize entrepreneurial failure (Scilitoe & Chakrabarti 2010; Mian 1997; Grimaldi & Grandi 2005), the failure rate of startups subsequent to participating in a business accelerator program (BAP) has been found to be quite high. However, those who have achieved success have been innovative in their field and have generated great financial rewards to more than remunerate the accelerator its equity stake (Needleman & Maltby 2012; Carr 2012).

2.1.5 BI services and other implications of the incubator

There is an abundance of academically published work that cites the beneficial utility of business incubators towards startups, particularly concerning having a higher success and growth rate than should the entrepreneurial unit choose to rise on its own without prior business expertise (Scilitoe & Chakrabarti 2010; Mian 1997; Reitan 1997).

The incubator and its hybrid spin-off, the accelerator, offer a multitude of services to the benefit of the startup. This assistance typically falls under the categories of business or technical. The former type of assistance includes areas related to business administration, e.g. the finance, accounting, marketing, management, customer relations, business contacts, and other related duties. Technical support concerns the functional aspects, such as intellectual property and copyright protection, scientific knowledge, trademarks and design, production processes, and the like (Grimaldi & Grandi 2005; Scilitoe & Chakrabarti 2010). The financial resources and technical support offered by the incubator to a startup firm often assists the entrepreneurial unit in decreasing its 'liability of newness'. During the establishment phase of the startup, the new enterprise attempts to survive in a hostile,

unpredictable environment, one wrought with critical challenges that the experienced incubators' management and networks assist to overcome. The liability of newness entails three aspects: 1) administrative and technical support, 2) a lack of recognition and presence in the market, 3) solitary development of the startup vs. growing among peers. Additionally, incubators aid the startup in creating synergies, in encouraging and actualizing the talent potential of entrepreneurial clients, and in achieving economies of scale and scope, among other things (Bøllingtoft & Ulhøi 2005; Grimaldi & Grandi 2005).

To encourage the entrepreneurial spirit of the founding enterprise, the incubator typically allows the startup management to retain a large ownership percentage of the firm. The incubator also safeguards the startup from many of the administrative obstacles that new enterprises often face when considering risk. Furthermore, the incubator assists in saving the incubatee from much of the sunk costs endured, such as time, effort, and finances in searching for basic infrastructural needs during the first few months of establishment (Hansen et al. 2000).

Furthermore, as Bøllingtoft and Ulhøi (2005) note, incubators assist “firms indirectly by placing the entrepreneurial actor in an environment of peers providing *[sic]* social inputs resources (network), and psychological support across and between tenants”. Hansen et al. (2000) claim that the services provided by incubators generally include facilities, mentorship, public relations, accounting, legal counsel, technical support, and other basic services; however, very few incubators offer an ‘organized network’. Thus, this formulates the notion that the networked incubator provides several advantages for the development of the startup.

There are indeed some cautionary details that startups should consider when undertaking a business incubator program (Hansen et al. 2000) in addition to the inability to assure any level of success under the auspices of an incubator, or any other assisting organization for that matter (Bøllingtoft & Ulhøi 2005; Lumpkin & Ireland 1988; Scilitoe & Chakrabarti 2010). The entrepreneurial spirit and ownership, for which maintenance is initially encouraged by incubator participation may be unexpectedly reduced should the incubator desire to seize an increased amount of equity or implement bureaucratic details. Indeed, there is much discussion concerning the suitability of the networked incubator for the startup. The network component may forcibly restrict those entrepreneurs who wish to remain self-dependent to comply with instituted standards. Furthermore, should the startup management

already have their own personal connections to the appropriate members of the industry, they may not be in need of an institutionalized network that may involve additional actors whose expertise may not be required (Hansen et al. 2000; Bøllingtoft & Ulhøi 2005; Tötterman & Stein 2005; Hughes et al. 2007; Lee & Jones 2008; Carr 2012).

However, there are remedies for overcoming some of these negative implications. Hansen et al. (2000) encourages strategizing the portfolio, where the diversity of other incubatees is limited, thus intensifying the leveraging and pooling of resources within the incubator organization. On the one hand, excess diversification may lessen the synergistic potential, whereas on the other, a narrow portfolio may increase competition among incubatees (Tötterman & Stein 2005). In addition, incubator applicants are encouraged to design a network scheme, in which actors are connected to the incubator more so than to other individual actors. Hansen et al. (2000) further promote the formation of formal internal networks, tracking individuals with expertise, planning frequent and constant meetings, constructing formal knowledge sharing flows, and establishing employment motivation and incentives.

2.2 The networked incubator

This section elaborates on the social aspects of the incubator, which provide an understanding of individuals involved in an incubation network, as well as predictors of the actor components for the research design. Of these are the networking resources obtained from social connections, stakeholders and their participants, accelerator structures, and the relationship of the networked incubator with the startup. Networked incubation is a process, whereby a startup becomes involved in a network structure provided by the incubator that allows the entrepreneurs to gain access to “a network system that provides extensive business connections” (Hughes et al. 2007; Hansen et al. 2000). A networked incubator with a wealth of interactive actors increases the potential for value creation, and therefore performance enhancement of the startup. Two of the yielding values are the attainment of resources and knowledge. Resources are defined as certain assets, such as access to capital (financial, human, land), technology, competencies, and intellectual property. Knowledge refers to transmissible information, “know-how, know-who, and experience” (Hughes et al. 2007). This is depicted in Figure 5, and is consistent with the later posited Figure 9. Social capital

and mutual resource exchange (in Section 2.4 Categories of social capital), in which several academics argue the benefits of social capital.

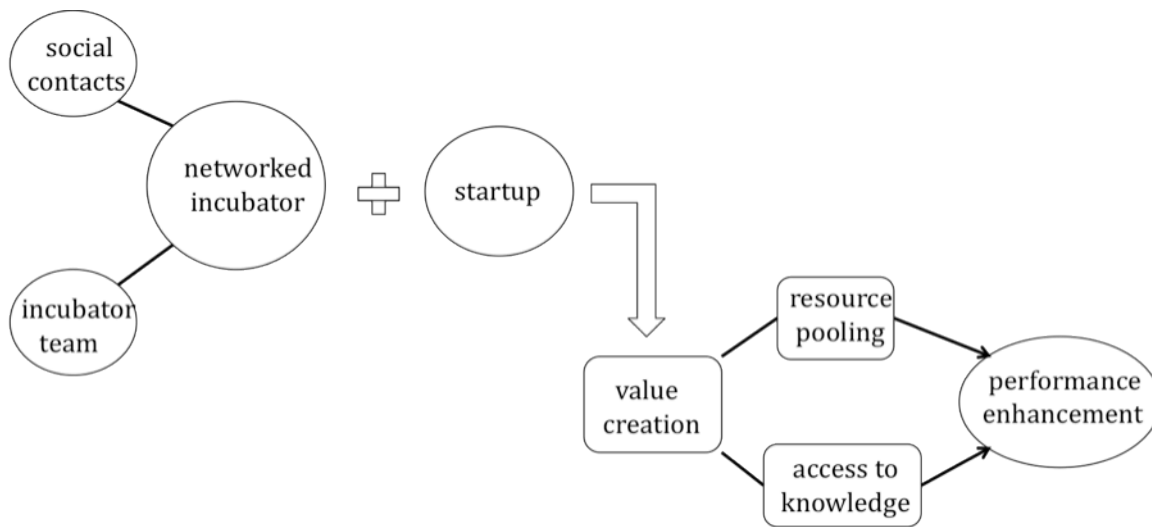


Figure 5. Value creation through networked incubators (Adapted from Hughes et al. (2007))

Previous academic literature suggests that incubator management is an effective source of business and technical assistance. Perhaps such assistance is provided more so than extended networks, as startups are directly engaged with these managers. As the psychological contact proximity of managers is relatively close to the entrepreneurial individual or team, managers may also be empathetic and capable of offering startup solutions, possibly to a greater degree than network members (Rice 2002; Hacket & Dilts 2004; Scilitoe & Chakrabarti 2010). Nevertheless, interactive collaborations with networking actors facilitate the spread of information, as well as expanding its diverse qualities (Hacket & Dilts 2004; Hansen et al. 2000; Hughes et al. 2007; Scilitoe & Chakrabarti 2010). Moreover, a study conducted by Scilitoe and Chakrabarti (2010) comparing incubation institutions in Finland and the US suggests that business and technical assistance cannot be fostered by incubator management alone, but also by an expanded contact network. The relevance of business and technical support as a provision of network actors then becomes a point of focus (Scilitoe & Chakrabarti 2010).

The idea of the networked incubator has only arisen until recently, despite the manifested benefits the organized networks have been known to provide. This appears to be so as given the abundance of potential network participants functioning as stakeholders in the traditional

entrepreneurial environment, few new business founders choose to search for these prospective partners, as there present difficulties in establishing the network connection. These impediments often stem from the profusion of applicants, which those with expertise already face. Thus, given the lack of time availability, few startups are supported. Nonetheless, considering the unpredictability of the web-based economy, access to resources and information is ever-more necessary, and a strong network support could easily link a given resource need to a suitable provider (Hansen et al. 2000; Lyons 2002; Tötterman & Stein 2005).

On a comparative scale with other business types, networked incubators broaden the dimensions of scale and scope, entrepreneurial motivation, and network access. Hansen et al. (2000) compares these three dimensions among networked incubators with venture capitalists and already established corporations on a relative scale. The authors posit that the latter two organizations are unable to supply all three dimensions effectively without sacrificing the provision of one or two of the other dimensions. For instance, regarding established firms, economies of scale and scope are high, entrepreneurial motivation generally low, and structural network exposure fairly moderate. In the case of venture capitalists, entrepreneurial spirit is quite high, nonetheless, the leveraging of resources for cost-saving efficiency and access to network connections are quite low. However, the capacity of networked incubators enhances the three dimensions simultaneously on an efficient scale. Here, entrepreneurial encouragement and preferential access to networks are high, while economies of scale and scope are fair. The following Figure 6 depicts the analyses contributed by Hansen et al. 2000. In this depiction, the maximum potential to be attained by networked incubators is illustrated.

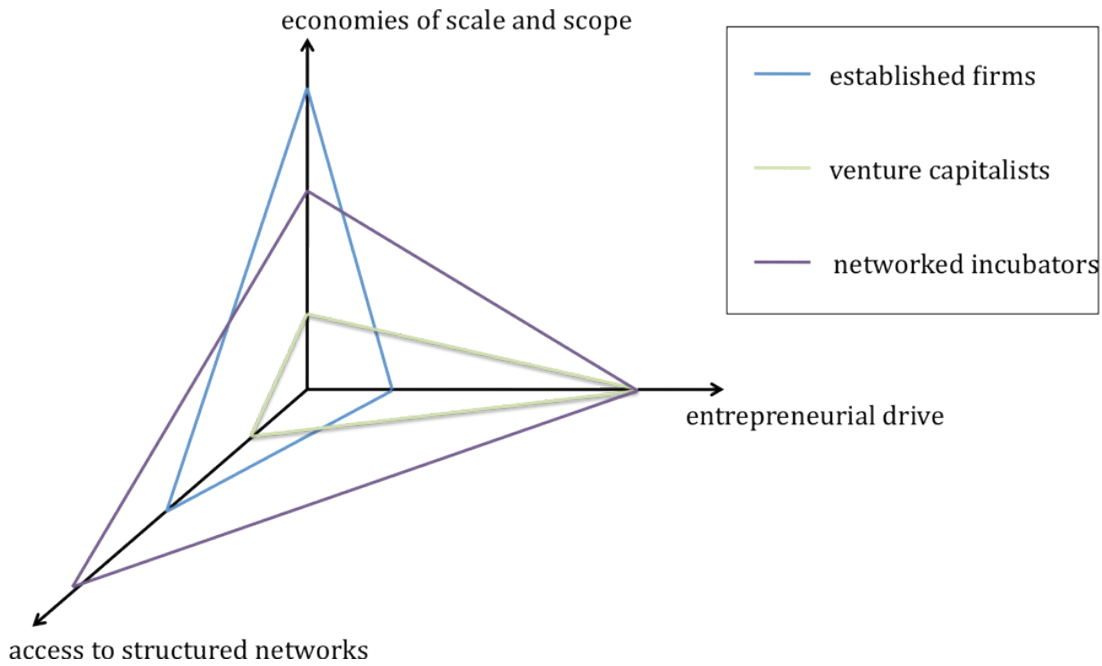


Figure 6. Comparison of provision breadth among established firms, venture capitalists, and networked incubators (Adapted from Hansen et al. 2000)

With access to certain competencies provided by partnerships and other affiliations, entrepreneurs can quickly overcome phases in the business cycle than without a network. Startups are evidenced by a shorter incubation period by participation in for-profit incubators than in non-profit. For-profit has more network involvement and a higher motivation for achieving initiatives than non-profit (Grimaldi & Grandi 2005). Nonetheless, regardless of for- or non-profit, all incubator types participating in the study conducted by Grimaldi and Grandi (2005) indicate the pivotal role of interactive network development. Management also plays a part in the formation of these network collaborations, and in building strong commitment, effective counseling, and time investment amongst engaging parties.

2.2.1 Stakeholders and other participants

Network relations may extend beyond the time period initiated by the incubation program and can result in long-lasting partnerships when the startup becomes independent from the

incubator (Grimaldi & Grandi 2005). Nonetheless, the outcomes of a networked incubation or acceleration program can yield incentives for all of the main actors involved: the incubator/accelerator, the tenant, as well as network members comprising the “non-financial rewards” of incubation, such as mentors (Chahal 2013). Indeed the most directly affected individuals participating in the incubation process have the most reward to gain or the most stakes to lose following the business incubation program. These individuals include the startup founders, incubation management team, the mentors, customers expecting results from incubation success (who may be government officials, taxpayers, or other business patrons), and others who have invested in the commercial success of the program (Aaboen 2009). Network actors providing services, such as legal, financial, or public relations also benefit from incubated startup success, as network members hold common equity with accelerator management (Miller & Bound 2011).

Particularly concerning the stakeholders of an acceleration program, beneficiaries also include angel investors, venture capitalists, tech firms, and other entrepreneurial units. These actors are able to leverage the talent of startup founders by recruiting or partnering, to achieve their own economies of scale by partnering with the new firms, to be introduced to other company founders and investors, and to expand professional networks (Miller & Bound 2011; Needleman & Maltby 2012).

2.2.2 Accelerators and the social structure

Bruneel, Ratinho, Clarysse and Groen (2012) describe the evolution of incubation as progressing in three generations. The first generation of BIs took place from the early onset in the late 1950s and lasted until the 80s at the start of the incubation boom. As this is the period in which the incubator began to take shape, its purpose and provisions to incubator tenants were likewise in the developmental phase. Physical facilities were offered and resources shared during this incubation period of infrastructure development in order that businesses achieve economies of scale. The second generation in the 80s is marked by a vision of knowledge promulgation. Here, business support and technical assistance proliferated for the purpose of ‘incubating’ fledgling companies in a learning environment, and focuses were to boost job and economic growth. The third generation of incubation from the 90s onward denotes the desire to leverage on external resources via interactive networks.

The opportunity for the incubator and thereby startup to expand its professional interactive network allows for a simultaneous amplification of its business platform, as well as that of other advantages presented earlier in the theoretical text (Bruneel et al. 2012; Hackett & Dilts 2004).

The benefits of the ‘networked accelerator’ are also elucidated by Miller and Bound (2011) and Wu (2011) as the provision of human capital to access resources and information, to reduce establishment and capital costs, and to raise the business platform to gain presence in the industry, among others. However, the long-term advantages of graduating from an accelerator program are yet to be researched.

As accelerators emerged during this third generation of incubation, the interactive network is perhaps a characteristic quite inclusive in its description. The following section elucidates the features of the networked incubator and the significance such an organization has on the establishment of startup tenants.

2.2.3 The networked incubator and the startup

The networked incubator concept is a new incubator model that is rooted in geographic proximity, economies of scale, organizational synergy, and relational interaction between an incubator unit with its network actors and the startup (Bøllingtoft & Ulhøi 2005). Scalability is also be enhanced, which in effect, efficiently enhances the capabilities of the company efficiently to include more functional input that expands beyond network connections. For example, as there essentially exists a bottleneck effect regarding the influx of business proposals, and the needs of other current projects that perhaps span beyond the human capacity of a few individuals who may be delegated these certain tasks, the implementation of certain mechanisms are needed to filter and fulfill these duties on an efficient scale (Hansen et al. 2000). Additionally, the Hughes et al. (2007) value matrix exhibited in Figure 3 (in Section 2.1.3 Incubators vs. accelerators) demonstrate that the potential for value creation in the context of incubation denotes a high value potential incubating firms can achieve based upon the combined intensive utilization of resource pooling and knowledge sharing through social relations.

Hansen et al. (2000), Lyons (2000), and Tötterman and Stein (2005) indicate that the networked incubator has in its capacity to expose startup teams to mentors, counselors and other experienced members of the same industry. Likewise, should the networking model program be adhered to properly and executed efficiently, the plan can simultaneously incorporate the expertise of participants from established corporations as well as the entrepreneurial drive and motivation of new firms. Higher rates of partnerships and collaborative arrangements than should the enterprise had attempted startup alone have been demonstrated by the participation in interactive incubation (Scilitoe & Chakrabarti 2010). It is also noted that “preferential access” to a well-distinguished company does not entail biased or privileged treatment of one new company over another. Hansen et al. (2000) explain preferential access as the ability to capture the awareness and engage individuals who otherwise have a full schedule on a daily basis. Furthermore, the authors stipulate that rather than encourage a bigoted environment, the immediate response of an expert to the startup would result in the market operating more systematically and in an organized manner than should such access not exist. Moreover, established experts can generate anticipation and interest in the fledgling enterprise to help breach the previously mentioned ‘liability of newness’ barrier (Hanson et al. 2000; Lyons 2002; Bøllingtoft & Ulhøi 2005; Tötterman & Stein 2005; Hughes et al. 2007).

2.3 Social networks in the context of the study

This section of the theoretical background chapter of the thesis explores networks, social capital, their components and structural manifestations. Social capital, as a demonstration of the benefits of networks, will be elaborated upon as well as the features contributing to its formation. Here, social capital is explicated with the purpose of defining networking resources pertinent to the research question and theoretical model (presented in Section 2.9 Framework and hypotheses).

Brief descriptions of ‘*networks*’ and ‘*social capital*’ for the context of this study were provided in the introduction chapter in Table 1. Descriptions of networks and social capital. Nevertheless, networks can also be categorized in various ways. For instance, network structures can fall into the cases of external or internal. External refers to the actors in the organization’s periphery, namely professionals, educators, and business people who are

willing to administer their services. Lyons (2000) stipulates that external networks are paramount for the incubatees to connect with members, as in a bridging or linking tie. Internal networks, on the other hand, are important for an organizational unit, as the majority of available information and resources are supplied under one leading unit. The individuals of whom internal networks consist are individuals within the incubation cooperative (Lyons 2000; Bøllingtoft & Ulhøi 2005; Tötterman & Stein 2005; Hughes et al. 2007).

For this research, ‘internal’ network structures are from the perspective of the startup and are those that include the incubator and entrepreneurial teams participating in the same cycle. The incubator and its management team are the intermediaries between the startup and the network actors provided by the incubating organization. There are also formal and informal networks, whereby formal implies business-related relationships, and informal are the connections made between non-business related contacts, e.g. acquaintances, family, or ‘love ties’ (Brüderl & Preisendörfer 1998; Bøllingtoft & Ulhøi 2005).

2.3.1 Interactive networks as a medium for resource sharing

Individuals are the driving force of the network and actualize the verisimilitude of the structural web by their very participation and involvement in social interactions (Denzin & Lincoln 1994; Bøllingtoft & Ulhøi 2005). The very outcome of “dynamic social interaction” among networks is social capital (Bøllingtoft & Ulhøi 2005; Lee & Jones 2008). These topics will be explained through social architecture, network structural types, homophily in network formation, categories of social capital, and network values, characteristics, and dimensions. These components and subelements of social architecture are the foundation for resource access. Additionally, Section 2.7 Knowledge sharing via network structures also elaborates on another key advantage stemming from social capital formation.

2.3.2 Components of social architecture

The essence of social architecture lies in the individuals and their respective relationships, and these two elements are held together by ties or bonds (Granovetter 1973). It is needless to say that there is an underlying importance of network formation. Additionally, firms

recognize the relevance of networks and find that group collaborations are pertinent towards organizational development (Cross, Liedtka & Weiss 2005). The three components of social architecture are social capital, organizational or corporate culture, and global mindset (Evans, Pucik & Björkman 2011). Figure 7 offers a visualization of these elements.

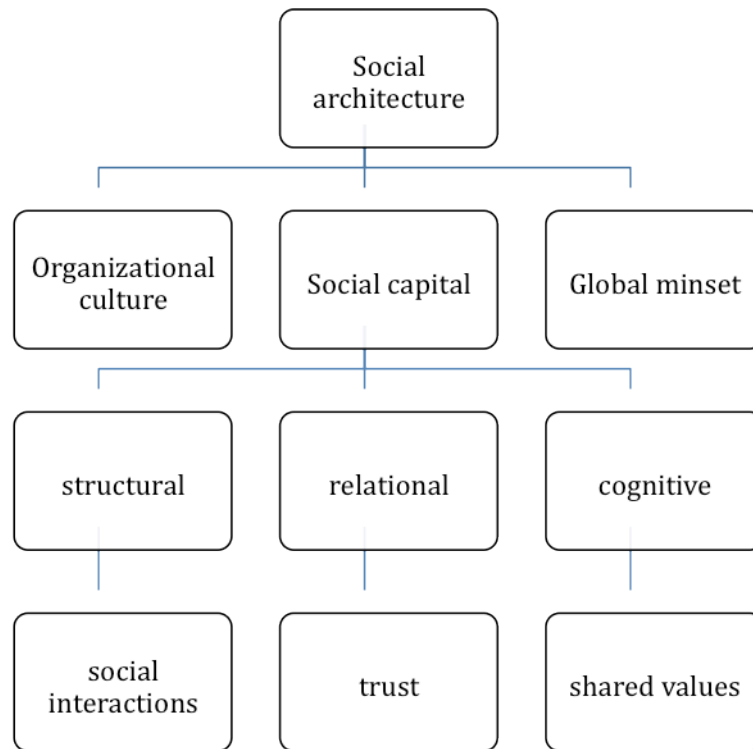


Figure 7. Breakdown of social architecture and social capital (Adpated from Evans et al. 2011, Nahapiet & Ghoshal 1997, Tsai & Ghoshal 1998, Tötterman & Stein 2005)

Organizational culture

Organizational culture refers to a characteristic that includes, but is not limited to, a collective set of norms, values, and beliefs implemented and governed by the leadership of the organization. These systemic elements are collectively upheld by the participants and representatives of the organization (Allaire & Firsirotu 1984). As these shared norms and beliefs establish harmony, whereby organization members can achieve objectives in an environment of mutual understanding. A strong organizational culture then establishes the foundation for the unit participants to function as a community (Allaire & Firsirotu 1984;

Evans et al. 2011; Dobson 2010). In addition, a strong culture will strengthen the knowledge flow and ease of access to information and other resources (McGrath & Sparks 2005).

Bogenrieder (2002) suggests that the actors in the social architecture structure are conducive to organizational learning, which sustains the organizational culture. Social relationships that are fostered during this process assist in the acquisition of problem-solving skills and filling structural gaps. Members in this network structure participate with each other and receive mutual benefits through interactive problem solving, thereby strengthening cooperation.

Global Mindset

The global mindset is an ethereal concept that constitutes a wide range of multicultural and intercultural understanding. It is this perspective that renders individuals in becoming “citizens of the world” (McPherson, Smith-Lovin & Cook 2001). The global mindset framework includes, but is not limited to, acquiring the abilities, knowledge, skills, and understanding to manage in a diverse and unpredictable environment. Cultural humility and transformative learning also comprise the global mindset framework. These characteristics assist the bearer in diffusing the cross-cultural barrier. However, these concepts may be difficult to grasp without appropriate levels of experience and interactive involvement, as individuals must be self-critical, open-minded and willing to relinquish ethnocentric notions. This concept, nonetheless, is perhaps easier grasped in theory than in practice (Levy, Beechler, Taylor & Boyacigiller 2007; Evans et al. 2011; Boutin-Foster, Foster & Konopasek 2008). International social relations are typically formed during periods of cross-cultural contact. These accumulated international experiences foster the enrichment of cultural sharing as well as knowledge exchange and modes of thinking. Moreover, individuals performing under the global mindset facilitate the creation of an open knowledge platform, whereby individuals of diverse backgrounds can contribute input (Bozkurt & Mohr 2011).

Social capital

Social capital is perhaps regarded as the key component of social architecture and these two terms are often used synonymously. It is regarded as individuals working in a collaborative

effort for the purpose of achieving a common goal (*OECD* 2012; Keeley 2007). Social capital comprises both tangible and intangible assets concerning human involvement in an organization. Tangible aspects include individuals, their roles, and the results of their collaborative efforts come to fruition; intangible aspects encompass personable qualities, such as trust, loyalty, friendship, norms, values, shared knowledge, and the relationship (Keeley 2007; McGrath & Sparks 2005; Evans et al. 2011). The concept of social capital is further delineated in following sections. Furthermore, it is this element of social architecture that is of focus for the research as the underpinnings of social networks are revealed for the study. Social capital also refers to the intangible “goodwill or benefit” transmitted by one set of individuals to another in the network process, not merely the physical outcomes that are generated by the network construct in itself (Nahapiet & Ghoshal 1998; Tsai & Ghoshal 1998; Hansen et al. 2000; Adler & Kwon 2002; Tötterman & Stein 2005; Patulny & Svendsen 2007; Scilitoe & Chakrabarti 2010).

2.3.3 Network structures: bonding, bridging, linking

The various types of social capital network structures have been outlined by several authors. The bridging and bonding networks, in particular, are often discussed. The social capital network denoting bonding is one consisting of strong ties and cohesion between the principal network actor and his or her network contacts, as well as among the network actors. This principal actor is also a connecting node for several clusters of other cohesive individuals and member groups. In the bridging social capital network structure, there are small clusters of cohesive ties among network members. Nonetheless, there exist large concentrations of ‘structural holes’ in the bridging network structure. These holes indicate the presence of weak ties linking one member cluster to another. The linking network structure is also noteworthy, although this kind of social capital is quite ambiguous and not incorporated into daily contact. For instance, linking relations may be government and other social institutions (Woolcock 1998; Patulny & Svendsen 2007; Lee & Jones 2008; Keeley 2007; Lee 2008; Evans et al. 2011). These network structures and structural holes are depicted in Figure 8.

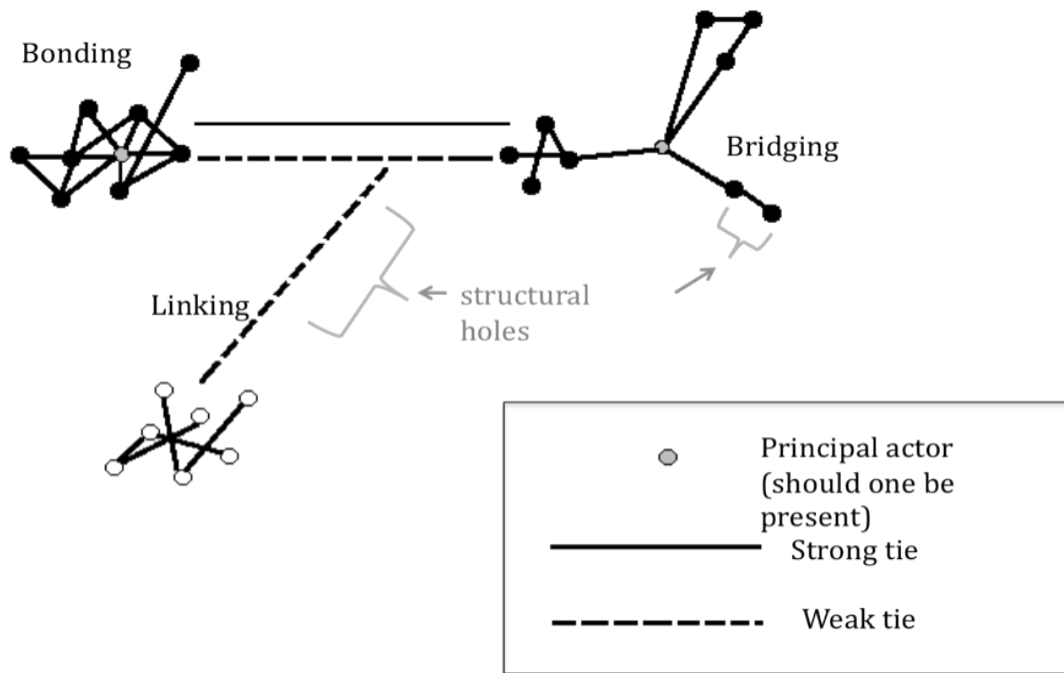


Figure 8. Bonding, bridging, and linking structures (Adpated from Granovetter 1973, Woolcock 1998, Watts 1999, Putnam 2001, Patulny & Svendsen 2007, Keeley 2007)

The three differing network structural types of bonding, bridging, and linking all naturally have their advantages and disadvantages. Bonding social capital, for instance, implies cohesive ties evidencing strong cooperation, trust, and homophily among network participants. Thus, the flow of information, knowledge, and other resources is easily accessible and more fluid among members. However, it may be difficult to adjust to an environment, which encourages constant entry of new potential network members, as well as to maintain strong contact with old and new members simultaneously. Regarding bridging social capital, individuals may able to seek resource and information opportunities through weak as well as strong ties. This also encourage resource-seeking behavior through alternative means, and additionally, gaining new social contacts. Nonetheless, as the bridging structure does not yield profound ties among all network actors, cooperative schemes are somewhat weak, and trust and loyalty are lacking (Granovetter 1973; Woolcock 1998; Putnam 2001; Keeley 2007; Lee 2008; Lee & Jones 2008; Patulny & Svendsen 2007; Evans et al. 2011). In the case of linking social capital, these ties are those that are emotionally more distant to the principal actor or cluster than a bridging or bonding contact. Linking structures may connect group communities to distant institutions, however, given the ambiguity of

connection and formulation of the notion, confidence and trust in such ties are also obscured (Patulny & Svendsen 2007).

It is the incubator management who serve as the primary liaison between the startup and the knowledge, experience, and expertise supplied by social capital (Hansen et al. 2000; Lyons 2002; Rice 2002; Scilitoe & Chakrabarti 2010). Here, the incubator or accelerator serves as the principal actor, bonded, on the one hand, to the incubatees, and simultaneously on the other hand, to the network actors providing business assistance. The incubator then bridges the weak connection between these two groups (Tötterman & Stein 2005). Furthermore, network contacts aid the incubatee in facing challenges and connecting the startup to other suitable networks should it be necessary that a further solution be sought (Lee & Osteryoung 2004; Tötterman & Stein 2005).

2.3.4 Network structure response types

Cross, Liedtka, and Weiss (2005) have stipulated three organizational social network response types, which include routine, modular, and customized. These response types appear to correspond to the bonding, bridging, and linking social network structures, respectively, thereby depicting characteristics of consistency among the network categories. The response types may also be applicable to incubation in regards to the breadth of services they provide to startups. The routine response type posits an internal network dependent upon actors in an individual cluster and is also perhaps characteristic of the bonding structure. In this case, startups may look to members of their own network for developmental business assistance. Concerning the modular category, units within a firm function with both internal and external departments in order to achieve the goal of the organization. Here, the startup engages with the accelerator in forming network connections in order that both incubator and incubatee can achieve a collective purpose. This description likely applies to the bridging structure, as there is a clear involvement of cross-networking. Collaboration among both strong and weak ties enhances informational access in addition to expanding network connections, however, dependence upon weak ties may lead to distrust or goal divergence. A customized network response may be executed in order to gather and compare resources from both internal and external members of the network structure. Here, actors within an establishing organization may reach out to members of institutions. Startups may contact via accelerators government

representatives, non-profit agencies, or other independent enterprises for assistance. Cross-networking then becomes prevalent and information transmission is an outcome. Nevertheless, the greater abundance of weak ties may result in the withholding of knowledge or lack of confidence in distant members (Cross et al. 2005).

2.3.5 Homophily in network formation

McPherson et al. (2001) put forth that homophily is the concept that individuals who share a set of similar traits have a greater likelihood of forming a network connection than those who share little or no similarities. The authors note some features uniting similar individuals, and these are presented in Table 6.

Table 6. Characteristics of homophily (Adapted from McPherson et al. 2001)				
Geographic proximity	Cultural resemblance	Behavioral similarity	Genetic likeness	Shared Values

Geographic proximity refers to the physical distance in which actors are located. The closer the individuals are geographically placed, the greater the feasibility for face-to-face interaction. *Cultural resemblance* entails similar lifeways, rituals, and customs; similar institutionalized experiences and understanding of societal functions are also a focus here. *Behavioral similarity* concerns personality and behavioral similarities within network clusters. Education, occupation, and religion are also features of cultural and behavioral likenesses. *Genetic likeness* includes physical appearance, race, ethnicity, sex, gender, and age. *Shared vision* encompasses empathetic notions, such as shared attitudes, beliefs, and ambitions (McPherson et al. 2001). Shared vision may be the key feature of homophily connecting the startup and the accelerator, as this organizational objective unites actors in both units to achieve business success.

Additionally, the social environment and the desire of actors' individual participation are also main elements determining the feasibility of the development of a homophilic social structure. Social relationships commence as either formal (business) or informal (more

personal connections than with the business ties). The research of Bøllingtoft and Ulhøi (2005) has shown that network connections amongst incubatees that are formal and a consequence of past collaboration may result in the present and future informal interactions. In addition, those social contacts that are informal may produce a formal partnering agreement. Should the values of the incubator and network connections be similar and hold, trust will inevitably develop between and amongst participants (Bøllingtoft & Ulhøi 2005; Keeley 2007; McGrath & Sparks 2005).

2.4 Categories of social capital

Social capital, as a component of social architecture, can be further classified into categories of its own. These attributes are the basis for the empirical study, as the manifestation of such capital is shown in the relationship between incubation actors and startups. The importance of social capital is prevalent in academic literature, with its significance first demonstrated in the work of Jacobs' more than half a century ago (Jacobs 1961; Bøllingtoft & Ulhøi 2005; Lang & Hornburg 1998). The three types of social capital are delineated as structural, relational, and cognitive. Structural social capital is represented by the web-like structural diagrams of networks. Relational capital refers to the personal qualities of individuals within network clusters. Cognitive social capital relates to the dispersal and sharing of knowledge, values, norms, and culture between and within individuals or clusters. Naturally, the more cohesive the structural bonds within a network web, the greater the potential of shared resources (Tsai & Ghoshal 1998; Bøllingtoft & Ulhøi 2005; Tötterman & Stein 2005; Lee 2008; Lee & Jones 2008; Evans et al. 2011; Kianto & Waajakoski 2010). Social capital encompasses the personable aspects of human character and relationships. For example, interaction and the socialization process are considered demonstrated forms of the structural dimension of social capital, trust a demonstration of the relational dimension, and shared values are exhibited in the cognitive dimension (Tsai & Ghoshal 1998; Patulny & Svendsen 2007; Lee & Jones 2008). Figure 7. Breakdown of social architecture and social capital as exhibited in section 2.3.2 Components of social architecture demonstrate the dimensions of social capital and their respective manifestations.

The applicability of the social capital dimensions to the incubation process, as well as their assessment and characteristics are outlined in Table 7 as presented by Tötterman and Stein

(2005). Structural social capital is exemplified by the incubation networks that provide access to resources. The cognitive dimension is described as the enhancing of personal relations among and within incubator and tenant groups. Similarities among incubatee clusters also influence the building of relationships based upon trust. The relational dimension is exhibited by the incubating organization and establishing network connections among close and distant actors for the startup (Tötterman & Stein 2005). Individuals, therefore, demonstrate great potential in closing structural holes in the cluster to achieve more global cohesion and strengthen structural capital within the unit and amongst other connected units (Hatala 2006). Strength in relational capital may also be obtained by demonstrating the global mindset, empathy, and trust. Network formations exhibiting cognitive social capital open the knowledge pool and the platform for partnerships in order to enhance relationship development and resulting knowledge flows (Lee 2008).

Table 7. Social capital dimensions and properties of incubation (Adapted from Tötterman & Stein 2005)

Dimension	Explanation in regard to incubation
structural	incubation networks
cognitive	development of relationships amongst incubator and incubatee actors
relational	incubators and their networks assist incubatees in seeking resources from distant sources (linking)

It has been argued that social capital can be accumulated merely through commitment, and not necessarily on a personal basis. For instance, weak ties may be strengthened by constant contact via the Web, such as virtual social network platforms and e-mail. These methods are not only simplistic in structure compared to the personal context, which may entail long geographical distances, but may even be key to maintaining a social tie given the persistence of time (Wellman, Haase, Witte & Hampton 2001; Tötterman & Stein 2005). While this example implies bonding a bridging tie, cross-border cultural interactions may perhaps be the most effective in establishing a long-lasting bonding tie (Bozkurt & Mohr 2011). Furthermore, the participants are the very essence of social capital capabilities (Lee 2008).

The social network accessible by the entrepreneur is a ‘critical success factor’ (Hackett & Dilts 2004; Tsai & Ghoshal 1998; Grimaldi & Grandi 2005). The idea of the networked incubator is predominantly based on the social capital theory, which entails the imbedding of social aspects in the very definition of the concept (Bøllingtoft & Uhløi 2005; Tötterman & Stein 2005). Reinforced and repeated social interactions evolves into trust. Tsai and Ghoshal (1998) demonstrate how the three dimensions of social capital link the facilitation of mutual knowledge and information amongst members in the same trust network, resulting in value creation. This result then enhances organizational performance. Figure 9 depicts the supposition.

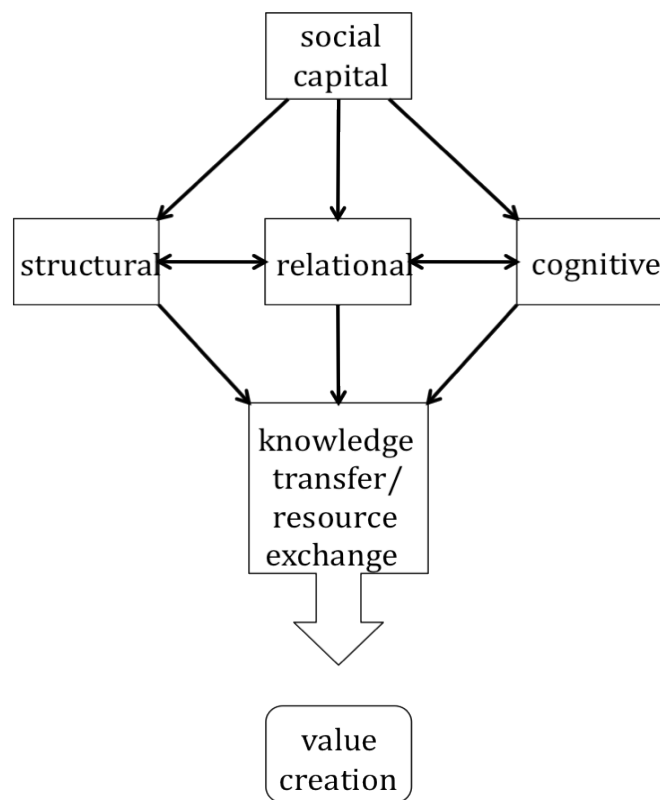


Figure 9. Social capital and mutual resource exchange (Adpated from Johanson & Vahlne 1977, Nahapiet & Ghoshal 1997, Tsai & Ghoshal 1998, Hughes et al. 2007)

Bonding and bridging network structures are interconnected and illustrated within social capital via trust. Patulny and Svendsen (2007) further elucidate the notion of trust, differentiating the idea into two categories: particularized and generalized trust. The former classification relates to a form of rationalization, in which trust is based upon experience and given information. Generalized trust concerns that which is based upon faith in human

beings. The authors connect particularized and generalized trust with bonding and bridging network structures, respectively. Bonding entails a kind of trust amongst close individuals, while bridging exemplifies the need to develop a sense of trust amongst distant members. These concepts are summarized in Figure 10.

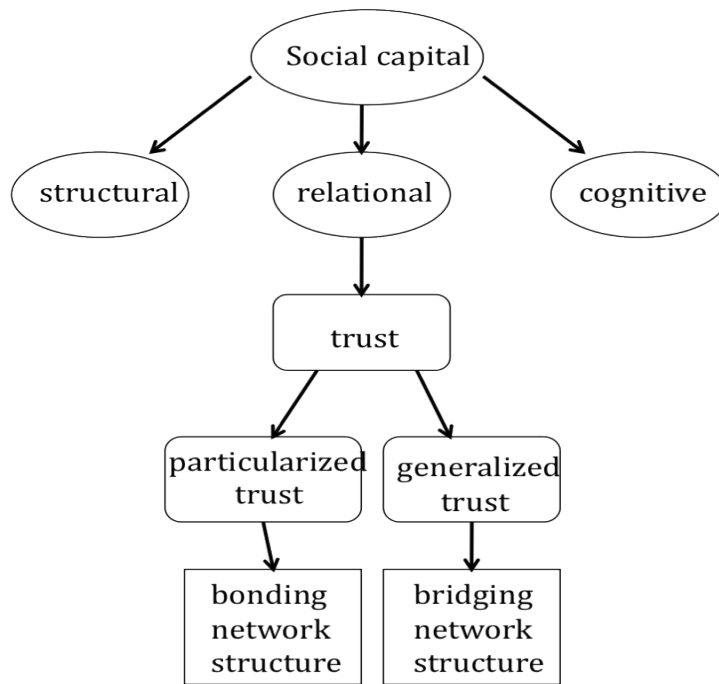


Figure 10. Generalized and particularized trust as a function of relational social capital (Adapted from Nahapiet & Ghoshal 1997, Tsai & Ghoshal 1998, Patulny & Svendsen 2007)

2.5 Network dimensions

The social network construct is reported to have first appeared in the work of Barnes in 1954 in order to describe communities or other group structures defined by its participants (Mitchell 1974). As noted in the introduction, networks are an umbrella concept that governs a wide spectrum of synonymous terms. As there exists difficulty in placing the term ‘network’ under rigid categorization, distinguishing features are delineated in order to solidify its meanings and associations. Elements to be considered when gauging the importance, or lack thereof, of the network to entrepreneurs are size, density, and strength or weakness (Brüderl & Preisendörfer 1998). Assessing the network dimensions will allow to evaluate which facets of networking should be measured in the study.

Brüderl and Preisendörfer (1998) stipulate that large and sparse networks consisting of distant ties facilitates the ever-broadening connections, and thereby resource and information potential among connecting individuals. Regardless of structure, the greater the number of actors involved, the more multi-faceted the cultural and knowledge exchange (Gattiker & Uhløi 2000; Bøllingtoft & Uhløi 2005). Perhaps the size of the incubator (and network actors inclusive) is a highly influential factor, as a great number of actors or a superfluous number of actor clusters may render the utility of the structural web obsolete. This supposition is supported by the notion that individuals may constantly depend on the idea that ‘someone’ is delegated the responsibility of a task, and the unit thereby becomes counterproductive. Moreover, a large network size may result in the lack of monitoring and follow-through duties, as well as diminishing the cognitive aspect of the social capital structure (Bøllingtoft & Uhløi 2005).

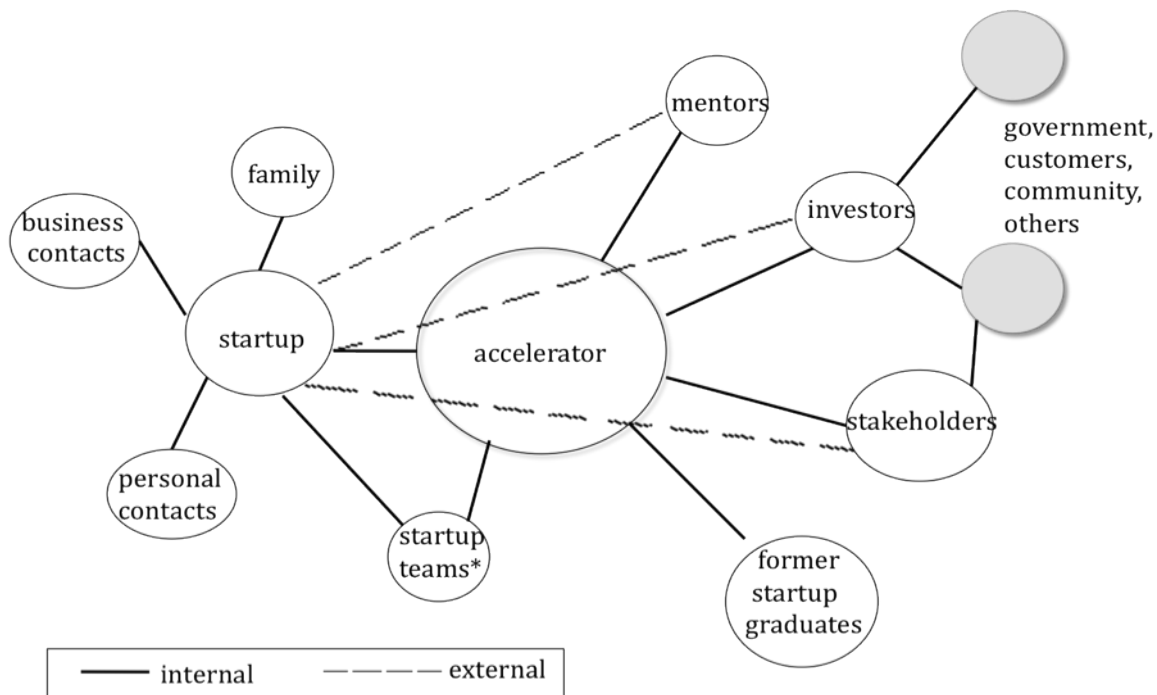
2.5.1 Types of accelerator network actors

Principal actors or actor clusters within the network have the capability of utilizing and expanding the potential of mutual knowledge and resource sharing, as these individuals are central in the network web (Tsai & Ghoshal 1998). Accelerators and other incubating organizations have a wealth of actors participating in the incubating community. As discussed earlier, internal and external network actors will be key to the study, and the use of these terms will be from the point of view of the startup.

‘Internal’ network members refer to the startups own personal and business contacts and individuals within the incubator (as the members involved in the incubating organization are the intermediary); in the case of accelerators, other startup teams in the same class will also be considered in the internal network. It has been noted that the actors internal to a ‘generic’ incubator network are “typically the set of incubating firms inside the incubator and any in-house service centers, on-site assistance organisations or outside firms brought in by the incubator’s management” (Hughes et al. 2007). Furthermore, perhaps one of the most valuable utilities supplied by the incubator are connections with other incubator tenants. The very nature of these relationships is quite feasibly interactive, as the incubatees are in a similar position, all operating under the same ‘landlord’. An environment of empathy is

inevitably established, and mutual knowledge is shared (Lyons 2002; Tötterman & Stein 2005).

‘External’ network participants are those within the network connected to the incubator and facilitating services towards startups (Lyons 2000; Bøllingtoft & Ulhøi 2005). These participants include, but are not limited to, ‘strategic actors’ (Grimaldi & Grandi 2005), experts in the field relevant to the startup, mentors, investors, former startup graduates from incubation programs, and incubator members participating in another branch location, should any exist. In addition to the members of the incubator, the startup, and the network of the incubator, the actors mentioned in Section 2.2.1 Stakeholders and other participants are also key figures in the incubation process. Examples of accelerator network actors are depicted in Figure 11.



*in the same class/batch

Figure 11. Example types of internal and external network actors available to startups (adapted from Lyons 2000, Brüderl & Preisendörfer 1998, Hansen et al. 2000, Bøllingtoft & Ulhøi 2005, Tötterman & Stein 2005)

2.5.2 Networking frequency

Mitchell (1974) purports the obsolescent nature of social network theories, as the rampant qualities of human interaction and behavior can only yield correlative results and not many patterns of consistency and predictability in long term analyses. However, two network descriptions may be characteristic to social structural formations, and these are presented as *interactional* and *morphological* network patterns. Morphological structures refer to the density, anchorage, reachability, range, shape and pattern of network constructs. These may also include the bonding, bridging, and linking structures presented by Woolcock (1998) and Putnam (2001). Interactional structural features are “content, directedness, durability, intensity”, and networking frequency is included (Barnes 1954; Wolfe 1970; Mitchell 1974). The qualities are delineated in Table 8.

Table 8. Interactional and morphological characteristics of network structures (Adapted from Mitchell 1974, Barnes 1954, Wolfe 1970)

Interactional:
<u>content</u> : the associations and underlying meanings of the relationship
<u>durability</u> : the length of time that the network connection has been in existence
<u>directedness</u> : the implicit or explicit nature of the social connection
<u>intensity</u> : the degree to which actors commit to responsibilities arising from the relationship
<u>frequency</u> : the rate of interactional occurrences among network actors
Morphological:
<u>density</u> : the degree in which actors in a network cluster are associated
<u>anchorage</u> : an indicator for the frame of reference within the network construct
<u>reachability</u> : the extent to which network actors are in mutual social contact
<u>range</u> : a measure of the variation in types of network actors present in the social structure

Moreover, the three components of social capital, when exercised simultaneously, aid in the contribution of the individual towards the group and organizational effort. Each of the

dimensions is connected to each other, as repeated social interactions (structural dimension demonstrating frequency of interactions) result in shared values or common goals (cognitive) and trust, reliability, or dependency among interacting individuals (relational) over time. In this way, networks are formed, and knowledge and resources transmitted (Tsai & Ghoshal 1998; Patulny & Svendsen 2007).

2.6 Network structures and the startup

Each of the elements of social architecture yields a great deal of benefits towards organizational performance. Regarding social capital, in particular, should social bonds be reinforced over time, the strength of network ties increases throughout the duration of the relationship (Granovetter 1973; Grimaldi & Grandi 2005; Bozkurt & Mohr 2011; Kianto & Waajakoski 2010). Therefore, the assertion rises that organizational units are competitively advantageous when linked with strong social ties. The actors within the network web are at the very core of organizational functions and are the sole enablers of forming the bonding, bridging, or linking connection with another member in the same or another network. As such, the individuals are the key factor in the realm of social architecture, and should the components of social architecture be fulfilled, these participants learn as well as share organizational cultures, embody the global mindset, and comprise the social capital network structure (Charan 1991; Bøllingtoft & Uhløi 2005).

Perhaps a network cluster is only as cohesively bonded and effective as measured by the strength of the weakest participating actor or cluster of actors. In line with this assertion is that members comprising a cluster's weakest ties bear the pressure of utilizing said tie to more cohesively bond the bridging connection in a sense. Though these connections may then be sparse and unpredictable, it is the actors in the weak ties who are perhaps more able to branch out of the periphery of the bonded cluster to seek outside resources (Bøllingtoft & Uhløi 2005; Granovetter 1973).

Effects directly stemming from a relationship between connecting social contacts are information exchange and social inclusion (Randel & Ranft 2007; Hughes et al. 2007). Bonding, bridging, and linking structures may aid in the formation of interactive collaborations and thus strengthen collective decision-making (Woolcock 1998; Kotlarsky &

Oshri 2005; Keeley 2007; Patulny & Svendsen 2007). Cai (2006) also notes that social constructs assist in increased knowledge sharing when bonds are established and strengthened over time. Keeley (2007), on the other hand, adds that social capital networks may be formed for the purpose of collectively implementing causes of an unjust nature. Nonetheless, bearing all of the above in mind, one of the most notable key characteristics of network formation is knowledge transfer and sharing, and this fact will be explored more in detail in Section 2.7 Knowledge sharing via network structures and explained in the context of accelerators and startups.

2.6.1 Incubation involvement in startup establishment and development

In the following section, network structures and their impact on the startup will be explained through the aspects of incubation involvement, the experience of the entrepreneurial unit undergoing incubation, and through the role of accelerators and their networks.

Accelerators and other types of incubators assist startups to achieve success in a number of ways. A number of provisions is explicated in Section 2.1.5 BI services and other implications of the incubator, which include business and technical assistance, seed funding, in-depth mentoring, and connections to network actors, among others. Concerning some methods in which incubators fund startups, the National Business Incubation Association (NBIA) specifies that BIs administer loans and microloans, assist startups in obtaining loans, and introduce the fledgling firm to interested venture capitalists and business angels (NBIA, 2009). In the case of accelerators, seed funding is generally provided in exchange for a certain percentage of equity stakes as the startup graduates and becomes independent (Miller & Bound 2011).

Additionally, repeated interaction within social networks facilitates in the development of trust relationships. Lee and Jones (2008) thus encourage institutionalized networking within an incubating organization, as shared vision among entrepreneurs and the incubator network can assist in overcoming initial hurdles and challenges. In addition to face-to-face contact, individuals are able to build and maintain bonding relationships via technology systems, such as via email or online social networking. Such institutionalized or ‘negotiated’ interaction may then allow the startup and incubator to fulfill objectives at an accelerated pace (Hansen

et al. 2000; Bøllingtoft & Ulhøi 2005; Tötterman & Stein 2005; Hughes et al. 2007; Lee & Jones 2008).

2.6.2 Entrepreneurs and incubation

There are numerous reasons as to why incubators and accelerators invest in startups. Investment in startups allows the incubator or accelerator to tap into a known market, as accelerator tenants tend to be competing in a turbulent and ever-changing environment. Entrepreneurships have traditionally achieved economic success by demonstrating innovative content, high employment, and high profit generation (Reynolds & White 1997; Scilitoe & Chakrabarti 2010). The new firm will then cover a lot of ground in exploration to produce new findings, which will be beneficial for the accelerator's enhancement of resources. Thus, the exchange of information and other knowledge assets is reciprocated between incubator and incubatee. Moreover, startups, or sole enterprises, generally constitute the largest singular contribution to job creation in an economy, though growth and survival are difficult tasks to maintain during the post-establishment period (Sherman 1999; Bøllingtoft & Ulhøi 2005). Startups revitalize the incubator portfolio, where incubators serve as a filter to the bottleneck effect, through which known companies must swim when tracking new talent. Additionally, this action is reciprocated as the regular provision of rising star companies results in continuing relations between the incubator and the established firm (Hansen et al. 2000).

Incubatees are either spin-offs, a project activated by a holding company, or Greenfield startups, an independent entrepreneurial unit (Hackett & Dilts 2004; Becker & Gassmann 2006). From the perspective of the incubator, startups are not all equal in their demonstration of talent and potential. Features that are considered are the degree of innovation, the target market, the industries involved, appropriateness of business concepts, etc. Thus, a suitable incubator must be found to tailor to individual needs (Grimaldi & Grandi 2005).

As explained briefly in Table 5. Incubators vs. Accelerators (2.1.3 Incubators vs. accelerators) delineating the differences between incubators and accelerators in the earlier portion of the theoretical settings, there may also exist a slight difference in startup applicants between the two ventures. Generally, the sole proprietor is not necessarily a single individual or a partnership, but rather may also be a group of collaborators. In the instance of

accelerators, startup applicants are typically small teams comprised of two or more actors (Bøllingtoft & Ulhøi 2005). An appropriate link between the startup and the network connections providing suitable assistance should be made by the incubator once the entrepreneurial needs are recognized (Lyons 2002; Tötterman & Stein 2005). Moreover, the startup environment in relation to geography may place restrictions on the selectability of incubators during the application process (Tötterman & Stein 2005).

Furthermore, startup teams may have experienced the ‘entrepreneurial crisis’, a syndrome of fledgling firms, whereby positive results have not yet come to fruition. This may be due to lack funds or management expertise, a poor business model or environment, failure to market the idea, or other reasons preventing the business from staying afloat. Business assistance is then sought by experienced individuals and experts (Specht 1994; Davila, Foster & Jia 2010).

Accelerators are generally oriented towards internet startups, seeking teams that are geared towards technology and its accompanying rapid-pace environment (Tozzi 2011). Given the short cycle of the acceleration period whereby startup companies graduate in a matter of months (Wu 2011) and compared to the traditional incubation cycle in which incubatees remain tenants for yearly periods (Vasil 2003), successful graduating candidates from a BAP are expected to quickly launch high-quality products and continue on towards commercial success (Tozzi 2011). While participation in a BAP is intensive, tenants must learn at a fast pace. “As part of the full-service engagement, the accelerator may offer intensive boot camps that equate to Entrepreneurship 101” (Fishback et al. 2007; Tozzi 2011).

Depending upon the incubation program, accelerators can intercept and offer assistance to tenants throughout the duration of the incubation period or require skill development at any given stage. The phases of intervention can vary among BAPs, though generally include *pre-incubation*, *business conceptualization*, *early growth*, *acceleration*, *exit*, and *independence*. *Pre-incubation* entails the decision to undergo and proceed with a BAP. The *business concept* is formulated and includes the business proposal and value proposition of the fledgling company. Non-profit oriented incubators generally collaborate with the startup in this phase, as cooperating members within the same industry are aiming towards a common goal, e.g. regional development, university research, etc. *Early growth* is manifested by proliferation of the new firm, in which the accelerator generally intervenes in startup assistance. Thereafter, the *acceleration* or incubation period follows, whereby startup

services are intensive, and rapid-paced learning and skill-development occur. *Exit*, graduation from the BAP, and *independence*, the eventual break-away from the auspices of the accelerator, are the last stages of the acceleration process. (Sherman 1999; Peters et al. 2004; Grimaldi & Grandi 2005). Figure 12 summarizes these phases.

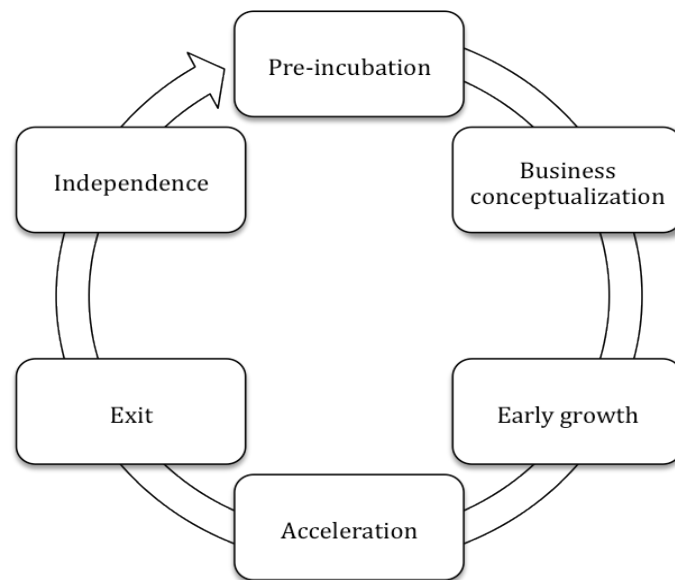


Figure 12. Acceleration/Incubation cycle from the startup point of view (Adapted from Grimaldi & Grandi 2005)

The incubation or acceleration period corresponds with the startup life cycle as noted by Peters et al. (2004). These stages are denoted in Table 9.

Table 9. Five phases of the startup life cycle (Adapted from Peters et al. 2004)

1) creation of the business idea, i.e. the product or service to be marketed is proposed
2) affirmation to undertake and continue with the actualization of the business prospect
3) pooling together of capital
4) establishment of the business
5) executing business transactions, expanding the enterprise, and realizing accompanying financial achievement

2.6.3 The role of networks for the startup

Startups are influenced by five main environmental components: social, economic, and political elements, infrastructure development, and market emergence factors. The social characteristic encompasses network and support members (Specht 1994; Mazzarol et al. 1999). Additionally, Brüderl and Preisendörfer (1998) note that there is a large body of evidence suggesting the relevance of social contacts to the creation and development of a new firm. These authors' research is based on the "network approach to entrepreneurship", whereby it is assumed that network resources are essential to new firms' upbringing. In fact, the process of network formation is undeniably inevitable in the business formation process, as the gathering and utilization of resources requires interaction amongst individuals. Networks are present in a variety of forms, such as resources, activities, and support. Social contacts involved in these networks are considered as informal, or distant, members who may channel resources and information much more effectively than formal, or close, social relations (Granovetter 1973; Brüderl & Preisendörfer 1998). Thus, networks are the very mediating actor in providing the services mentioned in Section 2.1.5 BI services and other implications of the incubator. Additionally, the advantages of the networked incubator explicated in Section 2.2 The networked incubator should not be disregarded (Hansen et al. 2000; Grimaldi & Grandi 2005; Scilitoe & Chakrabarti 2010).

Accelerators generally receive an inundation of applications per cycle, more so than they are able to retain. Simultaneously, as the selection process for participation in a BAP is highly competitive, many startups do not have the chance to launch with an accelerator, are established with other programs or institutions, or fail from the onset (Carr 2012; Strauss 2013). Though the success rate of startups graduation from an accelerator program has purportedly been low, the few firms that have survived have also achieved financial and other company successes, much so that returns have offset the majority of failed startups (Carr 2012).

Startup creation is the establishment, or launch of the enterprise (Peters et al. 2004). Subsequent to the independence phase of incubation, however, the startup may achieve survival, growth, or the enterprise may also result in failure (Watson, Hogarth-Scott & Wilson 1998). For the purposes of this research, startup creation entails graduation from a

BAP, though for a period of time thereafter, the outcome of the company could be success or failure.

The aspect of startup growth entails success and survival during and following the independence phase of the acceleration life cycle (Peters et al. 2004; Hackett & Dilts 2004; Grimaldi & Grandi 2005). As noted earlier in Section 2.1.4 The business accelerator, the chances for startup success are low (Carr 2012; Needleman & Maltby 2012). The growth of the startup may be demonstrated by the acquisition of the new company by a larger firm (Needleman & Maltby 2012). Yet another indicator of survival and growth is the internationalization of the firm.

Research conducted by Axelsson and Agndal (2000) posit the interactive social network as a key influence of internationalization, and noted five key components particularly pertaining to international social connections as a basis of their study. These dimensions concern the *importance*, *quality*, *origin*, *availability*, and *context* of the social connection, and are illustrated in Table 10. The *importance* of the connection refers to its bonding, bridging, or linking characteristic, as the strength or weakness of the relationship is key here. The *quality* of the contact involves the degree of depth or formality of the personal or business contact. The *origin* of the link applies to the original purpose for the formation of the link, and the time from whence and by whom, e.g. friends, family, or professional, the contact was established. Regarding the *context* of the social connection, network actors form relationships according to a common detail, e.g. psychological or geographical, much like those presented in Section 2.3.5 Homophily in network formation. Lastly, connection *availability* indicates the measure of activeness or dormancy of the link. Depending upon the appropriateness of each factor concerning links among actors in an international network, these elements may contribute to internationalization, and thereby growth, of the firm.

Table 10. Five dimensions of social contacts within a structural network (Adapted from Axelsson & Agndal 2000)

<i>Importance</i> of the connection	<i>Quality</i> of the connection	<i>Origin</i> of the connection	<i>Availability</i> of the connection	<i>Context</i> of the connection

Therefore, for the context of this study, the growth and survival of the startup are exemplified by the continuation of the firm to strive for development, expansion, and achievement during and after the independence phase of the acceleration period.

2.7 Knowledge sharing via network structures

Social contacts are an essential component of knowledge transfer, as interacting individuals are the medium through which information passes (Cai 2006). Learning is one of the processes to be attained via knowledge transmission (Hughes et al. 2007; Lee & Jones 2008). Becker and Gassmann (2006) identify knowledge strategies stemming from each respective incubator type delineated in their study. This result is evidential of facilitation of knowledge transmission within an incubating organization. A goal of the incubator is to stimulate the entrepreneurial firm performance by such knowledge dispersal. Knowledge sharing is then a possible indicator of networking resources that will be measured in the study.

Knowledge originates from the internal and external interaction of social actors involved within an organization. The sharing of knowledge is then a key function of incubator programs. It is also the main reason as to the formation of interactive networks within an organization (Becker & Gassmann 2006), and increases the likelihood of success in the incubation program (Hackett & Dilts 2004). The codified (i.e. written and replicated quite readily) or tacit (i.e. uncoded and difficult to transmit) quality of knowledge has an impact on the transferability of knowledge in a networked incubator (Becker & Gassmann 2006).

Moreover, knowledge sharing is an advantageous and mutually beneficial product of the incubation process for the main actor groups involved. In this case, they are the incubator management, the incubator tenants, and the resource providers. When effectively engaged, knowledge sharing aids in realizing economies of scale, as such transmission closes in on the deficiencies experienced by one party (Becker & Gassmann 2006; Grimaldi & Grandi 2005). Its movement is analogous to a network flow, and this is exhibited in Figure 9. Social capital and mutual resource exchange (in Section 2.4 Categories of social capital).

From an alternate perspective, there also exists a ‘dark side’ to the knowledge transfer process. Inhibitions may include miscommunication, inability or reluctance to transmit, or

lack of knowledge amongst all organizational members in general (Beckers & Gassmann 2006).

Hughes et al. (2007) maintain that a strategic network is the framework mediating the incubating firm, allowing the unit to access its potential. The authors thus encourage the fostering of institutionalized relationships between one organization and another, in this case between the entrepreneur and the available network provided by the incubator. Moreover, by facilitating in the formation of interrelationships, incubators aid the startup to strive for entrepreneurial prosperity more so than should the young firm attempt to do so alone. Once again, the value matrix Figure 3. Potential for value creation in the context of incubation presented by Hughes et al. (2007) (from Section 2.1.3 Incubators vs. accelerators). exemplifies the capability of startups to maximize on knowledge sharing through network constructions.

Knowledge sharing via a network structure is additionally represented by bonding and bridging and their relation to strong and weak ties. Bonding entails close, exclusive ties among actors whereby connections made remain within the group. Strong ties between the principal actor and between group members are formed by strong emotional attachment and other similar traits. Here, the clustered network undergoes the search for knowledge that is lacking within the group. Bridging exemplifies open, inclusive connections between and among groups. Strong ties are not concentrated heavily among member groups, but rather, there are several connections from group to group with the principal actor serving as an intermediary among actor-clusters. Knowledge transmission occurs in this structure, as those lacking such informational resources may obtain it from other groups in the periphery (Granovetter 1973; Watts 1999; Putnam 2000; Patulny & Svendsen 2007; Keeley 2007; Hughes et al. 2007). Figure 8. Bonding, bridging, and linking structures depicts the strong and weak ties among bonding, bridging, and linking network clusters (from Section 2.3.3 Network structures: bonding, bridging, linking).

The final topic to be discussed in the theoretical framework underlining the role of interactive social networks in the growth and development of accelerated startups are events. These are “occasions organized by the incubator and informal assemblies” and are paramount to the network development of the incubatee. These meetings may begin as formal events then become more informal over time, and may include but are not limited to, conferences,

presentations, social outings, dinners, and the like (Tötterman & Stein 2005). Hansen et al. (2000) add that the networked incubator provides tenants with the opportunity to receive “preferential access” (not to be confused with “preferential treatment”) to relevant actors during such meetings.

The culmination of graduation from the acceleration period is one of the factors differentiating accelerators and incubators (Isabelle 2013). This “pitch day” allows the startup teams expand on their network contacts, particularly in demonstrating their ideas to angel investors, business capitalists, and other professional advisors (Tozzi 2011). Therefore, the demo day and other formal and informal events are significant to the developmental framework of structural network formation to the accelerator-startup.

In the following section, the theoretical settings are outlined. Thereafter, the framework and hypotheses are formulated utilizing analyses presented in the theory.

2.8 Summary of the theoretical settings

This section summarizes the details explicated in this theoretical background chapter. Chapter 2.1 concerns the general role and emergence of the business incubator, or BI, from the historical to its practical aspects today. Prior to the prevalence of the BI, entrepreneurs sought financial and other assistance from relevant figures, such as banks, venture capitalists, business angels, or other institutions (Zider 1998; Keuschnigg 2004; Ibrahim 2008). The concept of the BI surfaced nearly half a century ago as a facility to house paying tenants and to distribute shared resources (*NBIA* 2009). From then onwards, there has been a global explosion of BI establishments, particularly in North America, Europe, and MENA regions pertaining to the context of this study. The entrepreneurial unit may participate in a BI program to minimize the risk of startup failure (Mian 1997; Scilitoe & Chakrabarti 2010), though such an undertaking does not eliminate firm closure altogether (Lumpkin & Ireland 1988; Bøllingtoft & Ulhøi 2005; Scilitoe & Chakrabarti 2010). Nevertheless, BIs provide a wealth of services that promote entrepreneurial growth as well as that of the economy on the larger scale (Peters et al. 2004, Grimaldi & Grandi 2005; *NBIA* 2009).

The BI, deemed an ‘umbrella concept’, has been difficult to pinpoint since the emergence of the term in academic literature, though most descriptions include the provision of facilities

and services in order to facilitate firm growth and development (Hacket & Dilts 2004; Hughes et al. 2007). The BI life cycle commences with a highly competitive selection process, followed by an administrative structural process, networked involvement by peers and mentors, and finishing with an exit stage (Becker & Gassmann 2006; Bergek & Norman 2008). There is additionally a seemingly endless number of taxonomic processes in which to scrutinize incubator types. They may be classified by funding or institutional origin or by profit orientation, among others (Grimaldi & Grandi 2005). Accelerators have been categorized as a subgroup of incubators, and are often defined by differentiating key characteristics relative to the incubator as exemplified in Table 5. Incubators vs. Accelerators (in Section 2.1.3 Incubators vs. accelerators). There are around 200 accelerators located internationally (Needleman & Maltby 2012), and characteristics posited by Miller and Bound (2011) that highlight key aspects of accelerators are noted in Table 2. Five principal characteristics of an accelerator (in Section 1.3 Key definitions). The services that incubators and accelerators provide to their tenants have been abundantly presented by various authors. These resources are those in the area of business administration, e.g. accounting, management, marketing, etc. (Grimaldi & Grandi 2005; Scilitoe & Chakrabarti 2010) and social network structure, among others, which are services provided through connected individuals (Hansen et al. 2000). Despite the benefits provided by BI and accelerator assistance, startup individuals and teams should likewise be wary of potential negative implications of participating in an incubator program, such as accompanying bureaucracy or possible excessive tenant dependency on the incubator (Bøllingtoft & Uhløi 2005; Tötterman & Stein 2005; Lee & Jones 2008).

The networked incubator arose during the third generation of the incubation wave. Where the first and second generations are mainly characterized by growth and development, the third is exemplified by incubators and their formation of interactive networks (Bruneel et al. 2012). There has been much presented evidence as to the paramount nature of the incubator on the success of the startup in acquiring business connections. The incubator offers a spectrum of capacities by joining together the individuals seeking resources to those providing them (Tötterman & Stein 2005). Startups linked to participants in a structured BI network thereafter gain access to capital, resource pooling, and knowledge transfer, and overcoming the ‘liability of newness’ factor, among others. In addition to the access to social networks, BIs also encourage the entrepreneurial spirit and facilitate the achievement of economies of scale more so than do venture capitalists or other established firms (Hansen et

al. 2000; Hackett & Dilts 2004; Hughes et al. 2007; Scilitoe & Chakrabarti 2010). Incubatee tenants are not the only individuals partaking in the outcomes of BI programs, as there are many stakeholders involved. Resource and knowledge transmission may be mutual among transferring parties. Business partners, government employees, and other patrons are those in high anticipation of incubation results (Grimaldi & Grandi 2005; Aaboen 2009; Miller & Bound 2011; Chahal 2013). Given the description of the three generations of incubation as well as the elements describing the accelerator, these analyses pave the way for the introduction of the “networked accelerator” concept.

Section 2.3 Social networks in the context of the study discusses the components of interactive networks and social capital. ‘Internal’ and ‘external’ network structures as presented by Lyons (2000) were elucidated for the purpose of this research. The combination of both internal (the incubator and network contacts supplied by the incubator) and external (the incubatees’ own networks) further not only increases the potential number of contacts and worthwhile relationships, but simultaneously enhances invaluable knowledge sharing inaccessible by utilizing resources provided by incubation management alone (Rice 2002; Scilitoe & Chakrabarti 2010).

The characteristics, upon which competent social interaction is dependent, are the strength and time endurance of the relationship and eagerness of the participants (Rice 2002; Scilitoe & Chakrabarti 2010). Social architecture considers the broad spectrum, of which interactive networks is comprised, and encompasses the dimensions of organizational culture, global mindset, and social capital (Evans et al. 2011). Social capital, in turn, is composed of three elements: structural, relational, and cognitive social capital; they are respectively manifested by social contacts, trust, and shared values (Nahapiet & Ghoshal 1998; Tsai & Ghoshal 1998). The web of network interactions is characteristic of structural social capital, which depicts the connection pattern available among the participating actors and their respective clusters (De Carolis & Saporito 2006; Scilitoe & Chakrabarti 2010). Here, the actor clusters are the incubator, the incubatee, and the accessible network of individuals provided by the incubator. Nahapiet and Ghoshal (1998) state that the element of counseling, falling under relational social capital, enhances knowledge sharing. These counseling collaborations then enhance the business- and technical-related aspects of startup assistance through increased frequency of interactions (Scilitoe & Chakrabarti 2010). Of the three dimensions of social capital stipulated by Nahapiet and Ghoshal (1998), the configuration of social contacts and network

ties falls under structural social capital. The cognitive aspect of social capital refers to the common language, culture, goals to be achieved, and mutual recognition of collaborating groups and individuals. The relational element considers the behavior, attitudes, and mindset that demonstrate trust, norms, and expectations (Nahapiet & Goshal 1998; Tötterman & Stein 2005; Patulny & Svendsen 2007).

The strength or weakness of ties can be measured by the frequency of contact and the following development and strengthening of bonds and trust networks. Network structures are exemplified as bonding, bridging, or linking. Bonding entails close, personal ties with the principal actor in a close group cluster. Bridging involves several small groups linked together by one common principal actor. Linking necessitates the connection of distant actors, such as those representing impersonal institutions (Scilitoe & Chakrabarti 2010; Granovetter 1973; Nahapiet & Ghoshal 1998). Social connections can be formed by the tenant outside of the networked counselors and investors provided by the incubator. For instance, several incubatee groups under the auspice of the same incubation institution may obtain assistance from each other. The element of trust within relational social capital emerges and is exemplified by mutual relations with the incubator. In this way, a linking tie is strengthened (Tötterman & Stein 2005). Moreover, McPherson et al. (2001) note that individuals sharing common traits may be more likely to form social connections than should individuals have dissimilar features. These characteristics of homophily are geographic proximity, cultural resemblance, behavioral similarity, genetic likeness, and shared vision.

Network dimensions discussed include size and density of networks, types of accelerator network actors, and networking frequency. Size refers to the number of actors (Bøllingtoft & Ulhøi 2005), types of actors to the specific individuals within the internal and external network (Lyons 2000), and frequency to the interactive quality considering the amount of time committed among meeting collaborators (Mitchell 1974).

Section 2.3 concerns network structures pertaining to the startup and reiterates the role that the networked incubator or accelerator has on the entrepreneurial unit. Additionally, there are discussions on the methods of providing financial capital to tenants, such as in the form of a loan (NBIA 2009) or seed funding in favor of equity (Miller & Bound 2011). Accelerators also benefit greatly from hosting tenants, as those new firms who proceed to become highly successful more than aid the accelerator in leveraging on the initial investment (Vasil 2003;

Tozzi 2011). As the accelerator attracts highly talented applicants, the incubator portfolio is likewise enriched (Hansen et al. 2000). The phases of the acceleration program to be undergone by startup teams are pre-incubation, business conceptualization, early growth, acceleration, exit, and independence (Sherman et al. 1999; Peters et al. 2004; Grimaldi & Grandi 2005).

Creation and growth of the startup are differentiated, creation being the establishment of the firm (Peters et al. 2004) and growth its continuation. After a period of time, the new firm may survive or fail (Watson et al. 1998). Other demonstrations of growth and survival are acquisition (Needleman & Maltby 2012) or internationalization (Axelsson & Agndal 2000).

Social capital has been shown to generate value creation through knowledge and resource pooling and transmission (Johanson & Vahlne 1977; Nahapiet & Ghoshal 1997; Tsai & Ghoshal 1998; Hughes et al. 2007). Lastly, accelerator events have an influence in allowing the startup teams to reach out to members of the network of the accelerator or the incubator. Formal and informal events as well as demonstration days are the main points of assembly here (Tötterman & Stein 2005; Tozzi 2011; Isabelle 2013).

2.9 Framework and hypotheses

The first and second objectives from the introduction chapter have been theoretically achieved via exploration of the topics as explicated in the theoretical settings. These and the third objective question concerning accelerator networks in the regions of North America, Europe, and MENA will be examined empirically in the research process following the research design. These goals are presented in order to gauge and provide further understanding of the business nature of the accelerator and to further reach the ultimate purpose of the study, which is to measure the role and impact of the accelerator on startup creation and growth. The first objective is first assessed here:

Why are accelerators exhibiting a large and ever-growing presence in the global business arena?

Accelerators are demonstrating an impact in international business by means of the information and resources they provide to new companies and the networking characteristics imbedded within the accelerator environment that also yield beneficial results to the entrepreneurial unit. Startups are exposed to a wealth of resources with their participation in a BAP (Tozzi 2011; Wu 2011; Miller & Bound 2011). Business incubators generally facilitate the fledgling firm in achieving a higher survival rate more so than should the startup attempt to strive on its own, as provisions include seed funding and overcoming ‘liability of newness’, entailing business administration and technical support, market presence, and business growth among peers or on the startups’ own (Vasil 2003; Grimaldi & Grandi 2005; Scilitoe & Chakrabarti 2010). A network of experts is also offered, consisting of peers and counselors who are then intermediaries to an abundance of resource and service provisions (Bøllingtoft & Ulhøi 2005). Accelerators as a subgroup of incubators (Grimaldi & Grandi 2005) supply very many of these same resources as the larger category of incubators. Nevertheless, given the accelerator’s rapid-paced environment, a BAP is essentially custom-tailored to the needs of the startup team consisting of individuals with an affinity for high technology and web-based applications and programs (Fishback et al. 2007; Miller & Bound 2011).

The second objective is then addressed:

Should the networks be instituted in a business accelerator program (BAP), what interactive actors and dimensions may contribute benefits towards the startup? Additionally, which benefits may be present?

The accelerator is a subcategory of incubators from the third generation of incubation, and this wave is characterized by the role of structural social networks of the incubator. Thus, the networked accelerator is a classification of the networked incubator, (Bruneel et al. 2012; Kopytoff 2012) which has demonstrated numerous advantages for the startup. The “extensive business connections” that the incubator supplies to the startup links entrepreneurs with capital and competencies is one example among others (Hughes et al. 2007; Hansen et al. 2000; Lyons 2002; Tötterman & Stein 2005). Hansen et al. (2000) advocate the implementation of a networking web within an accelerator’s program culture, asserting that networked incubators, more so than venture capitalists or entrepreneurs rising on their own, employ maximum efficiency of the combination triad of access to structural network

connections, achievement of economies of scale and scope, and maintaining a high entrepreneurial spirit. This is depicted in Figure 6. Comparison of provision breadth among established firms, venture capitalists, and networked incubators (from Section 2.2 The networked incubator). In addition, Hughes et al. (2007) claim that achieving dynamic incubation, which leverages resource pooling and knowledge sharing via network structures, aims for high value potential in outcome for the incubator and its tenants. Figure 3. Potential for value creation in the context of incubation (in Section 2.1.3 Incubators vs. accelerators) demonstrates these qualities. Moreover, enhanced social capital enriches mutual resource exchange, thereby resulting in added value creation for the firm (Nahapiet & Ghoshal 1997; Tsai & Ghoshal 1998; Hughes et al. 2007) and exhibited in Figure 5. Value creation through networked incubators (Section 2.2 The networked incubator) and Figure 9. Social capital and mutual resource exchange (in Section 2.4 Categories of social capital). Finally, Miller and Bound (2011) and Wu (2011) discuss the aspects of access to resources and information, reduction of capital costs, and enhancing the marketing platform as some among several benefits of a ‘networked accelerator’.

The individuals mentioned in the various studies concerning networked incubators are the actors involved in incubator and accelerator networks. These interacting figures are varied and perhaps incalculable, as the quantity and strength of social ties are difficult to gauge (Granovetter 1973). Depending upon incubator type, individuals representing varied categories of organizations may be involved in the social relationship network, such as academics in the case of university or government-backed incubation or business contacts in corporate-sponsored incubation (Zider 1998; Grimaldi & Grandi 2005). The actors presented in literature and general studies concerning incubators and accelerators include, but are not limited to, mentors, field experts, venture capitalists, business angels, former incubator or accelerator tenants, stakeholders, and personal contacts and business contacts (Brüderl & Preisendörfer 1998; Hansen et al. 2000; Lyons 2000; Bøllingtoft & Uhlhøi 2005; Tötterman & Stein 2005; Ibrahim 2008; Wu 2011; Miller & Bound 2011). These members of internal and external social network structures are exhibited in Figure 11. Example types of internal and external network actors available to startups (2.5.1 Types of accelerator network actors). Considered as a part of the “non-financial” advantages of accelerators, social contacts and stakeholders may also include patrons expecting certain outcomes from startup achievement and the management team of the accelerator as well (Chahal 2013). Additionally, data results gathered from the following study and exhibited in Chapter 4. Empirical research and

findings will perhaps yield more types of participating individuals. The dimensions of social network constructs that have been elucidated for the purposes of this study are the size and density of social networks, the types of network actors, and the frequency of networking interactions. These elements are derived from the studies conducted by Gattiker and Ulhøi 2000; Bøllingtoft and Ulhøi 2005; Tsai and Ghoshal 1998; Lyons 2002; Tötterman and Stein 2005; Barnes 1954; Wolfe 1970; and Mitchell 1974, in which the importance of these dimensions are stated. Perhaps other interactive dimensions will be deciphered from research results, as given the wide spectrum of network analysis possibilities (Mitchell 1974; Brüderl and Preisendörfer 1998), outcomes yielded are expected to be broad and varied.

Following the presentation of the hypotheses, the objectives and the research question will be tested empirically in the Research methodology and Empirical findings chapters. A framework map depicting the theoretical flow of the study is exhibited in Figure 13. Theoretical model for the study. This theoretical structure explains accelerators' manifestations and features of interactive network constructs, as has been demonstrated by incubators on the whole (Wu 2011; Chahal 2013), and posits these influence of these factors on startup success. Accelerator events, such as demonstration days, conferences, workshops, and volunteer opportunities provide social networking opportunities for participating individuals, including startup teams, accelerator management, and stakeholders alike (Tötterman & Stein 2005; Tozzi 2011). Additionally, it is also supposed that connective meetings at such events will link startups to support members, allow to obtain startup funding, and provide teams with suitable knowledge. Mentors, investors, former startups, and accelerator members in other locations (both national and international) are elements to be considered. Finally, international connections, i.e. whether or not the startups are international relative to the accelerator are also to be tested against startup outcome. The arrival at *H1*, *H2*, *H3*, and *H4* are explicated below, as well as outlined at the end of the chapter in Table 11. Summary of hypotheses.

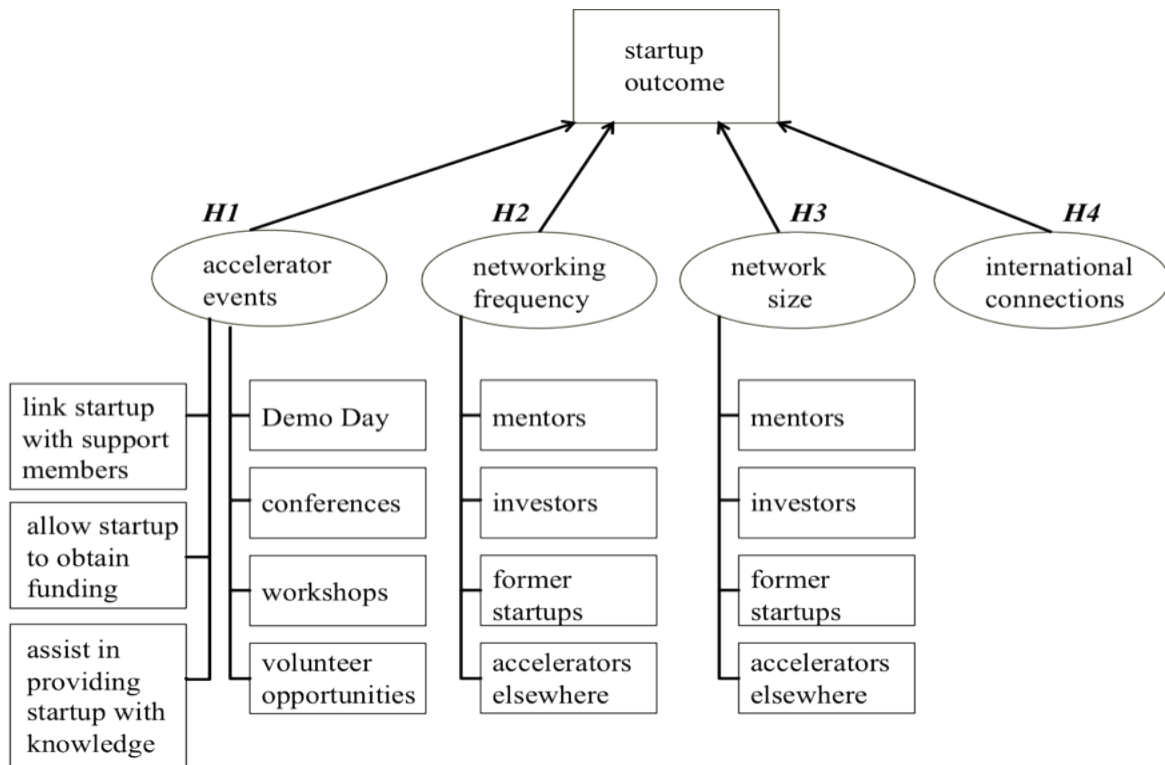


Figure 13. Theoretical model for the study

The key beneficiary of the business accelerator program is the startup, and the premise of the research lies in the assertion that a networked accelerator will enhance the survival and development of the fledgling firm. These descriptors will be exemplified by the creation and growth of the entrepreneurial unit. Startup creation is denoted by the founding of the organization (Peters et al. 2004), and growth by its progression in hopes of expansion and success. Growth will then be further characterized by business growth activity, acquisition (Needleman & Maltby 2012), or international expansion (Axelsson & Agndal 2000).

The framework for the hypotheses is reinforced by the theoretical settings and a descriptive analysis is explained following each conjecture and in accordance with a respective hypothesis.

Based upon the value creation model Figure 3. Potential for value creation in the context of incubation of Hughes et al. (2007) (Section 2.1.3 Incubators vs. accelerators), it is purported

that incubators involved in high networking activities achieve dynamic incubation, thus realizing their value creation potential. Additionally, Hansen et al. (2000) assert the effectiveness of the networked incubator towards startups, namely that of maximizing the combined elements of achieving economies of scale and scope, access to social contact networks, and maintaining the entrepreneurial spirit. Social networks fall under the structural dimension of social capital (Tsai & Ghoshal 1998; Lee 2008; Evans et al. 2011), and as such, are demonstrated by the individuals linked together by bridging, bonding, or linking structural connections (Patulny & Svendsen 2007; Lee & Jones 2008). Furthermore, the study conducted by Tötterman and Stein (2005) reveals that “various occasions organized by the incubators and informal assemblies are commonly seen as important when determining the level of ‘networking activity within the incubator communities’ ”. That is, meetings between startup teams and incubation management are pertinent to firm development, network establishment, and possible collaboration amongst engaging individuals. These meetings are events, such as demonstration days, conferences, seminars, and outings, whereby individuals interact and have the opportunity to form social connections and mutually leverage supplied resources (Tötterman & Stein 2005; Hansen et al. 2000). It is therefore conjectured that these formal and informal meetings and events provide networking formation potential. This then enhances access to knowledge and business resources, encouraging firm growth and thereby positing the first hypothesis:

H1: A greater number of events provided by the accelerator is positively related to a lower rate of startup failure.

It is perhaps quite evident that the greater the number of interacting individuals that are present in a social cluster, the larger the network web. Many participants establish a sense of community, which operates on a scale larger than simply by a single individual (Granovetter 1973). Startup collaborations among social contacts within incubating organizations enable interactions and network formations, whereby mentoring is allowed to flourish among cooperating members (Hansen et al. 2000; Bøllingtoft & Ulhøi 2005). These counseling interactions as a form of mentoring networks facilitate the spread of knowledge (Nahapiet & Ghoshal 1998; Scilitoe & Chakrabarti 2010). Thus, the assertion is put forth that network connections, be they strong or weak, effectively facilitate the transmission of information, knowledge, and other resources. Referring to Figure 5. Value creation through networked

incubators (2.2 The networked incubator), there is indeed an impact on the startup's output value garnered by the utilization of resources and knowledge supplied by social networks (Johanson & Vahlne 1977; Nahapiet & Ghoshal 1997; Hughes et al. 2007). As a morphological dimension of network constructs (Barnes 1954; Wolfe 1970; Mitchell 1974), the greater the network support, the greater the predicted performance outcome of the firm. This then contributes towards the likelihood that with the greater number of supporting individuals working with accelerator management, the higher the interaction with and resource flow towards startup teams, thereby solidifying the establishment of the new firms. The second hypothesis is then postulated:

H2: A larger network is positively related to the number of startups created.

As a prelude to the third hypothesis, it is noted that frequency is an important variable when considering social networking interaction viability, as acquisition of knowledge involves “close, repeated interactions” among network connections (Hughes et al. 2007). Moreover, the strength of a connection is gauged by a “combination of the amount of time, the emotional intensity, intimacy...and the reciprocal services which characterize the tie” (Granovetter 1973). Frequency is an interactional dimension of networking (Barnes 1954; Mitchell 1974) and structural dimension of social capital, and as such, demonstrates the relational and personal elements of relationship development, such as the building of trust, empathy, and rapport (Tsai & Ghoshal 1998). Additionally, homophilic traits stipulated by McPherson et al. (2001) are recognized and strengthened by enhanced frequency among bonded or bridged relationships. Therefore, the repeated interactions ideally reinforce bonds between and among socially connecting actors. In addition, interconnected members are mutually benefited and likewise hold stake, as actors affiliated with accelerator operations and those of the startup team are eager to actualize the commercial success of incubation outcomes (Aaboen 2009; Chahal 2013). It is then stipulated in the third hypothesis that:

H3: A higher frequency of network interactions is positively related to the success rate of the startup.

The last hypothesis is constructed from the framework of network densities. Similar to the importance of network size as an influential element proposed in *H2* above, this supposition utilizes a spatial arrangement and expands on the second hypothesis by including a geographical component in the social structural web. The focus here is on the effectiveness of a startup actor's interaction with another member at the international level and not only on the domestic, in achieving entrepreneurial growth. Not only do business strategy and managerial decisions play a role in the global expansion of a startup, but social network formations have also been paramount in the internationalization process of entrepreneurial units (Coviello & Munro 1995; Coviello 2006). Furthermore, Johanson and Vahlne (2009) posit that the internationalization process relies heavily upon the transmission of knowledge and learning. Such information and resources are disseminated via actors within the social capital construct in contributing towards value creation and firm performance (Nahapiet & Ghoshal 1997; Tsai & Ghoshal 1998; Hughes et al. 2007). Similar to the Uppsala Model demonstrating the tendency to select markets of entry based upon homophilic qualities, such as geographic and psychic distance (Johanson & Vahlne 1977, 2009; McPherson et al. 2001), startups may choose this route for the company's own expansion as well as strengthening of network bonds in a similar manner with individuals involved. It is then presented in the final hypothesis that:

H4: More international connections are positively related to startup growth.

The four hypotheses are outlined in Table 11. Utilizing the theoretical settings as a basis for the hypotheses development, Figure 13 explicates the general structure formulated subsequent to the literature review and that which will be subsequently tested in the research methodology and findings section.

Table 11. Summary of hypotheses

<i>H1: A greater number of events provided by the accelerator is positively related to a lower rate of startup failure.</i>
<i>H2: A larger network is positively related to the number of startups created.</i>
<i>H3: A higher frequency of network interactions is positively related to the success rate of the startup.</i>
<i>H4: More international connections are positively related to startup growth.</i>

3. RESEARCH METHODOLOGY

This chapter outlines the research approach utilized for the purposes of this study. Justification is provided regarding the research design, specifying a quantitative research method. Additionally, the strategy, collection method, and the measurements of the research are outlined. The empirical objectives of the study are outlined in 3.3 Research design. Finally, an explanation is provided regarding the validity and reliability of the data.

3.1 Research approach

The research philosophy considers knowledge and its origin and facets as exemplified in the research onion presented by Saunders, Lewis and Thornhill (2009). There are many categories of these philosophies pertaining to research and in conducting a study, as well as subdivisions of classifications between. The philosophy pursued in this study is positivism, whereby the hypotheses are posited and subsequently tested. Additionally, a deductive reasoning approach will be followed in order to attain causal explanations for occurring phenomena (Creswell 2008). In this case, those regarding interactive networks and their role on the startup are considered. As much is known concerning the advantages garnered by startups involved with networked incubators (Hansen et al. 2000; Vasil 2003), the focus in this study is to isolate accelerators as a subgroup of incubators (Grimaldi & Grandi 2005), and determine if similar startup successes apply. Moreover, the view of ontological subjectivism is taken in the attempt to assess the reality of the accelerator's social networks and whether or not they pose meaningful interactions and results towards the establishment and development of startups.

3.2 Quantitative research method

According to Creswell (1998), the research process generally follows a qualitative, quantitative, or mixed method scheme. The mixed method generally implements the use of both qualitative and quantitative methods or the mix of another approach. Qualitative studies entail a more subjective analysis than the quantitative method, and are suitable for studies utilizing inductive reasoning, as fields yet unexplored require the discovery of knowledge.

Nevertheless, analyses observed from cases under a qualitative method may not necessarily be applied or generalized across populations. Quantitative studies, on the other hand, yield more objective results than do qualitative studies and generally utilize a statistical construct. However, this type of study may not explore a case in-depth or be as multifaceted as a qualitative study. The most suitable research design deemed appropriate for this study is a quantitative method, and the hypotheses presented in the previous chapter will be tested in this manner given the data available to commence the analysis.

3.3 Research design

Saunders et al. (2009) note the various categories of research strategies as experiment, survey, case study, action research, grounded theory, ethnography, and archival research. The empirical method of testing selected for this study is the analysis of statistics gathered from an online survey. This strategy is chosen for several reasons. First, the results obtained from the sample of respondents will be used to analyze the population, i.e. accelerators and their networks in the North American, European, and MENA areas as a whole. Secondly, the survey was available on the Web and open to response from the beginning of June 2013 to the middle of September 2013. Given this time period and the collection at this point in time, the survey is the most economic strategy in obtaining relatively rapid response (Creswell 1998; Ghauri & Grønhaug 2005). Lastly, the form of data collection is an electronic questionnaire, whereby potential respondents were provided a link to the survey via e-mail.

The measurement variables (explained in the next section) were selected upon ascertaining the empirical goals of the study in order to achieve the purpose of the research. These objectives are outlined from the onset of, and are continuous through the theoretical framework. From these settings, the survey was then formulated based upon the concepts explicated in the theoretical portion. The survey structure was to be designed following the assignment of the control, independent (predictor), and dependent variables. The survey is then used to gauge the perceptions of accelerator management concerning the importance of networking aspects, such as network mix or size, the frequency of interactions between the accelerator actors and startups, accelerator events, and international connections. From the data compilations, direct effects will initially be assessed to determine the most influential indicators of startup outcome, should any be prevalent. Indirect effects will be evaluated

afterwards, with the goal of attributing intermediary influences predictor variables may have to yield a combined influence on startup success.

The population was determined and selected from available university course material, as well as from an online accelerator database, the Seed Accelerator Database (<http://www.seed-db.com/>), with an explicit focus on accelerators located in the regions of North America, Europe, and MENA. Additionally, a couple of accelerators were contacted upon the suggestions of other accelerators. Furthermore, many accelerators constitute growing international top seed accelerator programs (Christiansen 2013). The attempt was made to contact all of the accelerators whose access information was made available. A statistical analysis was conducted on data collected from the survey responses, and herein lies the sample.

The questionnaire is tailored to the “landlord” point of view, and the rationalization for this stance is that accelerator management recognizes the structure network of the incubating organization. Here, the “tenants”, or incubatees, may have a lack of understanding of the network model available to them or varying ideas of the concept in the context pertaining to its particular case (Bøllingtoft & Ulhøi 2005). In the study conducted by Bøllingtoft and Ulhøi (2005), for instance, should a social connection commence on the business level and progress into a personal relationship or vice versa, network constructs and their purpose may be misconstrued by participating members. Thus, the point of view here is taken from the principal body (accelerator management) linking the actor clusters (the accelerator’s network and the startup team) together.

The survey was designed with the premise of testing the hypotheses. As a large number of questions posed would perhaps result in reluctance to respond (Ghauri & Grønhaug 2005), ten multiple choice questions were presented to contacts. The topics of these questions relate to the theoretical framework (presented in the second chapter of the study) in order to test the hypotheses. These themes concern the accelerator locations, experience with startups, interactive networks and social events provided by the accelerator, types of actors, frequency of meetings, international affiliation, and other potential factors contributing to startup success. More detail is elaborated in the measurements section below.

Surveys are typically characterized by either open-ended or close-ended questions. Those that are open-ended in nature allow for the respondent to provide exploratory responses, whereas close-ended types feature restrictions in response outcomes (Foddy 1993). Though the questions were close-ended in this particular questionnaire, respondents were not forced to answer every question (i.e. skipping questions was permitted), and an ‘other’ or ‘additional comments’ field was an open-ended element accessible for some responses. In addition, as the survey was dispensed electronically, recipients were notified that questions and comments could be posed via e-mail should they arise. The questionnaire was formulated via SurveyMonkey®, and question types included single textbox, multiple choice (both single and multiple response types), matrix of choices (posing Likert-scale items and some opportunity to utilize an “other” or comment box), and ranking schemes. Although oftentimes pivotal in demonstrating the effectiveness of a survey prior to dispersion, there was no pilot testing conducted, as some restrictions concerning the sample may have arisen. For instance, the predicted rate of return was not high enough to exclude certain members whose input would be valuable to the study, and that would otherwise be discarded from the small sample portion should they have participated in a pilot test (Nardi 2003). Nevertheless, each query within the survey was constructed with the aid of a knowledgeable advisor and subsequently reviewed by colleagues to ensure coherence and that there would be no leading questions. The designed questionnaire is included in the appendix of this thesis.

3.3.1 Measurements

The variables considered in this study are explained in the following paragraphs and are accordingly coded within parentheses in order to facilitate the data analysis process to come. The control variable is denoted by *the region in which the accelerator is located* (i.e. headquartered, excluding multiple locations). As the data pertaining to interactive networks gathered are relevant to the respective accelerator from which they were generated, the location plays an important role in this study. The limitations of the research are centered on three regions of focus: North America, Europe, and MENA.

Independent variables are the size of the social network, the number of hosted events, the frequency of network interactions, and the size of the international network. In the context of

this study, the types of network actors considered are those, with whom the networked accelerator are principally linked, and those whom the accelerator links to the startup.

The quantity and quality of actor categories provided by the accelerator are simultaneously measured. *The size of the network of the accelerator* (ACCELSIZE) is the number of the different types of actors participating in the social circle that encompasses accelerator personnel, the startup teams involved, and the network available to the accelerator and its tenants. *The quality of the accelerator's network actors* is the type and associated influence and impact an actor is perceived to have on the establishment or development of the startup. The densities of networks have been shown to be an effective element of cooperation in knowledge flow processes (Tötterman & Stein 2005). This measurement was determined by posing the following query: *Which of the following network connections are offered to startups and can you rate its importance?* Available responses are *mentors; investors; former startup graduates; accelerator members in another state/country; other*. A Likert scale ranging from 5 (*very important*) to 0 (*not important at all*) as well as the options of *no link between this actor and startup* and *no opinion* were provided for each response possibility, respectively.

The frequency of network interactions provided by the accelerator and in which startups participate (FREQINTERACT) examines the amount of time participants dedicated towards their meetings. Scilitoe and Chakrabarti (2010) have noted that lengthened time duration of interactions enhances such relationships. Furthermore, frequency of contacts strengthens social bonds over time (Granovetter 1973; Nahapiet & Ghoshal 1998). As noted by Becker & Gassmann (2006), the quality of network interactions is a difficult characteristic to measure; thus, it can perhaps be gauged by the time in which incubatees and other actors are in correspondence. The frequency of networks variable was assessed by inquiring to the best of the respondents' knowledge, *For each actor in the network, please specify the approximate number of hours they commit to meeting with the startup during the acceleration period*. The actors supplied in the above query concerning network actors were utilized once more: *mentors; investors; former startup graduates; accelerator members in another state/country; other*. With each respective actor was a matrix of choices providing corresponding amounts of time invested in the relationship, representing hour increments as: *10-20 hours; 20-30 hours; 30-40 hours; 40+hours; or no link between this actor and startup*.

The number of the types of events (NUMEVENTS) concerns the quantity of formal and informal meetings and activities initiated by accelerator management and provided to startup members. Events are seen as a platform for startup teams to socialize and form interactive connections with individuals encountered therein (Tötterman & Stein 2005). Additionally, the demo day has been the subject of particular importance (Isabelle 2013), and will also be examined. This variable was analyzed by asking, *Do you organize events for startups whereby network connections can be made? If so, could you rate its importance?* (This first question is referred to as NUMEVENTS1.) The matrix of choices provided and whereby more than one possibility could be selected were *Demo Day; conferences; workshops; volunteer opportunities; other*. Each option was respectively supplied with a Likert scale in order to assess relevance, or lack thereof, ranging from from 5 (*very important*) to 0 (*not important at all*) as well as *there is no such organized event* and *no opinion*. Moreover, in examining the importance of these meetings, a further question was posed, *Could you rank the importance of organized events for the startup?* (NUMEVENTS2) The matrix of choices included: *events link startups with support members; events allow the startup to obtain a source of funding; events assist in providing the startup with technical knowledge and other know-how; organized events are not very beneficial for the startup*. A rating scale posed ranges from 5 (*very important*) to 0 (*not important at all*) or *no opinion*.

The international connections demonstrated by the accelerator (INTLCONNECT) are the international relationships present in the network web of the accelerator and the startup. Social constructs have demonstrated relevance towards the internationalization process (Coviello & Munro 1995; Coviello 2006). Likewise, the internationalization process has had an influence on network and firm development (Johanson & Vahlne 2009). This variable was measured by asking about the accelerator's international locations (1), as well as the international whereabouts of its tenants (2). (1) *Do you have multiple locations? If so, how many branches are there and where are they located?* Responses included: *North America; Europe; MENA; other* respectively accompanied by the number of locations as *no multiple locations; 1-3 locations; 4-7 locations; 8-10 locations*. (2) *Of the active startups, approximately what percentage is international?* Response options included: *0-20%; 20-40%; 40-60%; 60-80%; 80-100%*.

The dependent variable is the *startup outcome* (OUTCOME), i.e. creation, success, or failure. In the context of this study, creation refers to establishment of the startup, and success or

failure refer to the continuous or final outcomes following survival or growth (Watson et al. 1998). As the question of success or failure can be quite subjective, accelerator responses were compared to data obtained concerning numbers of active startups as well as closures. The variable pertaining to the startup outcome was measured by posing three questions. (1) *How many startups in total have been established with the accelerator as of today?* Possible quantity selections were: 0-10; 11-20; 21-30; 31-40; 41-50; 50+. (2) *What is the approximate rate of startup success and growth?* Rate options were: 0-20%; 20-40%; 0-60%; 60-80%; 80-100%. (3) *In your opinion, which of the following may be contributing factors to startup success?* Multiple choice possibilities (more than one could be selected) were: *large network in terms of size; types of network actors; number of hours of counseling and interaction with network actors; other.*

3.3.2 Data collection

This data collection section provides some details pertaining to the descriptive measures of the sample. Around 140 accelerators located in the three regions of focus were contacted. Most of the survey responses were received within a week. Those companies not generating a response were contacted a second and third time via e-mail correspondence, as the first and second rounds of replies yielded an insufficient number in producing a substantial sample. There were altogether 35 survey submission returns with location responses as follows: 13 North America, 18 Europe, 4 MENA. The pie charts demonstrated in Figure 14.1 and Figure 14.2 provide visual depictions of the sample distribution of survey contacts and returns by accelerator location.

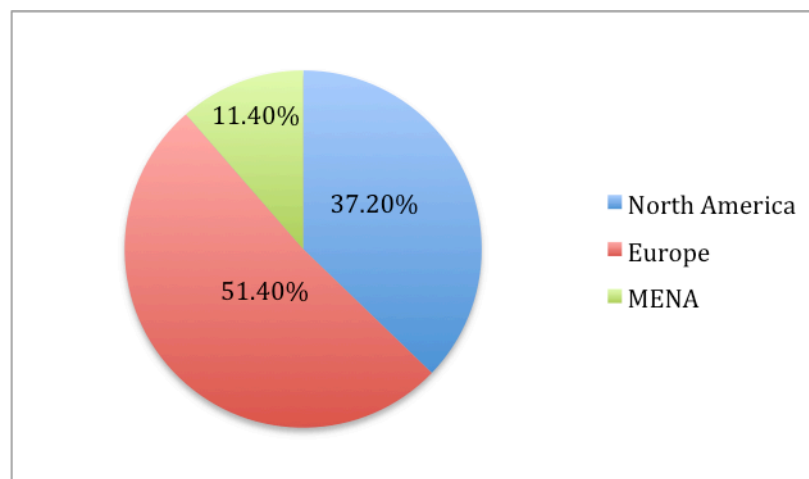


Figure 14.1 Accelerators contacted by region

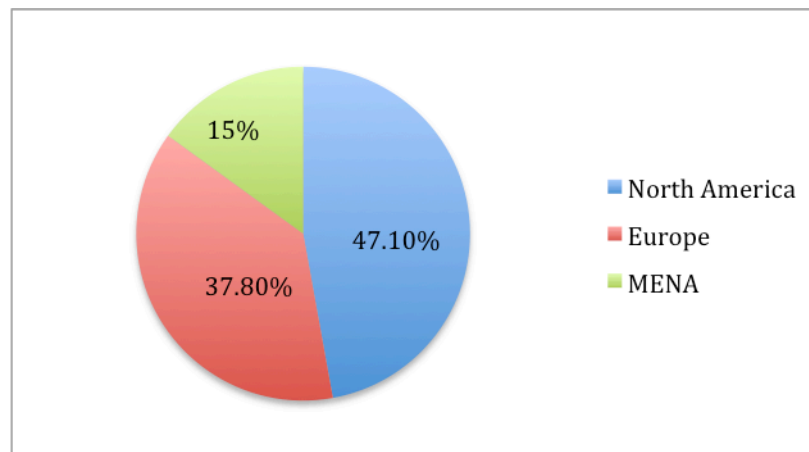


Figure 14.2 Accelerator response by region (Source: survey results)

Given the sample sizes and research design and methodology, a regression method was employed and performed on the sample representing each region, as well as the three regions as a whole. The tests of statistical significance and the results of the regression follow in the next section and chapter.

3.4 Reliability and validity

When considering the implications of research instruments, such as the survey, the reliability and validity must be assessed. Reliability refers to the consistency of the data output, i.e. should the analysis be repeated in a similar setting, so should the results generated be identical in nature. Validity refers to the accuracy of the research methods in generation of the findings. There are three forms of validity: *content*, *predictive* or *concurrent*, and *construct*. Content validity involves the applicability of the survey instrument to measure that which it intended. Predictive or concurrent validity refers to the ability of data results to predict a measure or correspond to other results. Construct validity concerns the quality of the survey to accurately measure concepts (Creswell 2008; Saunders et al. 2009).

It is to be recognized that no singular model can universally account for the ever-changing elements in a given social environment, therefore, any posited assumption or theory may need to be restricted to and explicated in a particular context (Bøllingtoft & Ulhøi 2005). There are a number of characteristics that may conflict with the reliability and/or validity of

the research. This being mentioned, attempts were made to draw out these interferences all the while striving to maintain an academically sound quality of research.

As this research utilizes a quantitative research method and survey analysis, the data output may not yield exploratory results. The survey strategy also presents a close-ended quality to the outcome possibilities, as respondents are only able select answers from those provided, although an 'other' or 'comment field' was provided as an option in some instances. Additionally, this strategy has notably limited exploration of those explanatory or external factors outside those considered in the context of a particular study (Saunders et al. 2009). Furthermore, the sample represents a portion of the population, which falls under the category of judgment sampling, a method of nonrandom sampling in which surveyees were selected based upon their qualifications (i.e. the essential nature of being an accelerator in one of the three regions described) necessary to complete the questionnaire (Kvanli, Pavur, Keeling & Seaver 2006).

The point of view of the survey respondent is that of the accelerator. Outcomes may be subjective from any one particular perspective; however, this case concerns the opinions of accelerator personnel as to the outcome of startups. Furthermore, there may be external factors not considered in the scope of this study, which may play a role on the growth and development of startups. Such external elements may include, but are not limited to, that concerning culture, corporate, or the corporate culture. Although the respondent should be representative of the accelerator, the data for one accelerator may be the opinion of the single respondent. As such, some responses may lead to biased statistical results (Creswell 2008), nevertheless, the argument for this choice of sampling is that the gathered data offers qualitative outcomes and may still yield correlative results (Marshall 1996).

Feedback received from some of the respondents who left one or more questions with no response stated the ambiguous nature of some of the questions, as skipping questions was permitted in order to avoid forced submission of opinion. This the lack of response may denote lack of willingness or comprehension of the question, but also results in lack of usable data for a particular accelerator and the corresponding questions, perhaps as well as a response bias (Fowler, Gallagher, Stringfellow, Zaslavsky, Thompson & Cleary 2002). However, the occurrence was rare, and these questions in particular will be further assessed to determine the overall effect, should any exist, of the skipped question on the results.

Moreover, only a fraction of those receiving the questionnaire submitted a response. Skewed statistical outcomes may also occur with the survey method, as results depend upon the willingness or reluctance of responses (Ghauri & Grønhaug 2005). The sample sizes per region are quite small, and therefore may not be entirely representative of the respective region, much less the population.

All of the above in mind, literature regarding quantitative research methodologies is recognized. The statistical method of analysis performed on the data is a regression model, as this approach is used to measure the correlation between two or more variables (Kvanli et al. 2006). However, it is important to note that correlation does not imply causal effects. Additionally, data demonstrating extreme results may weigh heavily on the overall outcome of the analysis, as the sample size is relatively small. Nonetheless, tests of significance will exhibit a strength or weakness of association, from which there may be evidence of comparisons or interpretive analysis, or the possibility for inferences be made for future research (Creswell 2008). In this case, regression outcomes may exhibit the extent to which networked accelerators have an influence on startups.

Tests of significance were performed in order to enforce the reliability of the data. These statistical tests are generated alongside the regression, which is explained in the next chapter concerning Empirical research and findings. In addition to the survey designed to be as coherent as possible and the statistical tests of significance performed on the data, all other efforts were made in attempt to ensure a thorough follow through of procedures and data analysis.

4. EMPIRICAL RESEARCH AND FINDINGS

This chapter elucidates the regression analysis performed, a description of the data yielded from the study, implications caused by the limitations of the research, and an evaluation of the research objectives.

4.1 Regression Analysis

There are several statistical operations to consider when conducting data analysis depending upon the data set and the type of data, among others. Prior to the execution of a statistical analysis on data, the following must be considered: the economic theory upon which empirical testing will be performed; a model based upon and elucidating said theory; suitable and sufficient set of data accompanying the empirical procedure collected in a timely manner with the rejection of extreme resultant values; and a statistical measuring tool and software to implement the analysis (Kvanli et al. 2006).

A regression model was deemed the most suitable for this study, as this tool is utilized to gauge correlating elements between two or more variables, should such correlation exist (Kvanli et al. 2006). Moreover, this research in particular aims to determine the degree to which startup outcomes can be determined by interactive network properties.

Linear and multiple regression analyses were performed on the data. The multiple regression model is based upon the simple linear model (*UCLA 2006*), which is represented by

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

According to Kvanli et al. (2006), $\beta_0 + \beta_1$ denotes the “assumed line about which all values of X and Y will fall” while Y is the dependent variable to be explained, X is the independent explanatory variable, and ε represents the error component. This linear regression model attempts to demonstrate the extent to which Y can be explained by X. β_0 is the intercept, X as an independent is the predictor variable, in which more than one may be present, hence: $\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \dots + \varepsilon$.

A multiple regression was chosen as the statistical predictor model for the data requiring its implementation (discussed below), as it is similar to the simple regression model, however, it allows for the presence of more than one independent variable (*UCLA*, 2006). The variables described in Section 3.3.1 Measurements are accordingly illustrated in short form (noted in parentheses next to each variable) in order to ease and facilitate the analysis process, and the resulting descriptions are provided in the subsequent section. Data descriptions are presented below followed by the regression analyses.

4.2 Data description

Table 12 exhibits characteristics of accelerators and their respective tenant startups in the samples collected.

Table 12. Sample descriptives (Source: survey responses and research data)

	North America n=13	Europe n=18	MENA n=4	3 regions n=35
Average age (years)	3.46	2.58	2.25	2.87
Average total number of active startups as of this year ^a	33	36	35	35
Startup success and growth rate ^b (mode)	4	4	3	4
Percentage of international startups ^c (mode)	1	3	5	1
^a data were gathered from accelerator information online, not of those assessed from survey responses ^b startup success and growth rate was coded as “1”=0-20%, “2”=20-40%, “3”=40-60%, “4”=60-80%, “5”=80-100% ^c percentage of international startups was coded as “1”=0-20%, “2”=20-40%, “3”=40-60%, “4”=60-80%, “5”=80-100%				

The overview of the averages analyzed of the regions in which the accelerators are located do not yield much variation. Accelerators in general are a young category of incubators, with the

majority having been launched in the past two to three years and very few older than a decade (Grimaldi & Grandi 2005; Bruneel et al. 2012). Among these three regions, North American appears to have the oldest accelerators and MENA, the youngest. Older and perhaps more experienced accelerators may achieve a greater number of startup graduates than younger accelerators, as the time elapsed may have allowed for experience development and enabled the mentoring of several batches or classes. The highest frequency of respondents reported the success rate of startups to be in the 60-80% range, though academic literature and other articles concerning the topic of accelerators has suggested perhaps an even lower rate--that the rate of failure lies in the majority of startup candidates (Mian 1997; Scilitoe & Chakrabarti 2010). The older accelerators in North America and Europe note higher frequencies of success and growth rates, however, lower frequencies of international startup groups. International startups appear to be somewhat more prevalent as a percentage of startups on the whole in the European and MENA regions than in the North American area, perhaps as even within the former two regions, there are more countries among them than in the latter region.

The statistical measuring tool utilized in producing the regression was Microsoft Excel 2008 in conjunction with Statplus:mac LE tutorials. Tests of significance among data were performed by measuring the adjusted r^2 and the p-value outputs from the statistics program. Responses gathered from the survey results were collected in an Excel spreadsheet and regressions were executed on the dependent variable OUTCOME against each independent variable *ACCELSIZE*, *FREQINTERACT*, *NUMEVENTS*, *INTLCONNECT*. Responses were input in the spreadsheet "as is" for *ACCELSIZE* and *NUMEVENTS*, from 5 (very important) to 0 (not important at all), along with the following assigned in order to gauge measurements: 0.5=no link between this actor and the startup, -0.25=no opinion, and -0.5=no response, respectively. The importance rating each accelerator has ascribed to the type of network actor corresponds to the impact that the accelerator personnel perceives the actor to have on startup success. Additionally, it is assumed that such perceptions are accompanied by a prevalence in the presence of network actors. *FREQINTERACT* hours were denoted as follows: 1=no link between the network actor and the startup, 2=10-20, 3=20-30, 4=30-40, and 5=40+. Lastly, respective *INTLCONNECT* and *OUTCOME* samples were entered into the spreadsheet as: 1=0-20%, 2=20-40%, 3=40-60%, 4=60-80%, 5=80-100%.

Certain measurements generated from the Excel program exhibit particular importance regarding the regression. The coefficient determines positive or negative correlation between the independent and dependent variables, and the intercept demonstrates the start value of the dependent variable. The correlation coefficient, r , lies between -1 and 1, inclusive; the closer the value of r is to -1 or 1, the greater the presence of correlation between the X and Y variables (either negative or positive, respectively), while an r value equal or close to 0 yields less or no correlation (Kvanli et al., 2006; UCLA 2006). The correlation coefficient was measured by engaging the “Pearson’s r ” function in Excel. The coefficient of determination, r^2 , indicates the ‘goodness of fit’ of the linear regression, and has a value between 0 and 1, inclusive. This strength of association is calculated by squaring the correlation coefficient, and from this, the overall significance of the regression model is observed (Hofler 2013). The standard error, or standard deviation, measures the variability of each datum to the mean, and this value is measured using the STDEV. The slope and intercept are also generated in order to determine a positive or negative relationship, as well as the overall linear formula.

The generated probability, or p, value determines the significance of each variable. This value and the strength of association will be observed in order to determine the overall significance of the regression models. The p-value is calculated in Excel with the formula TDIST ((=TDIST($r \cdot \sqrt{\text{number of observations} - 2} / \sqrt{1 - (r \cdot r)}$), number of observations, 2). Generally accepted p values in determining significance are $0 < P < 0.1$, with those measuring lower than .01 as highly significant (Scheaffer, 1999).

Centered variables were formulated in order to provide comparable values between independent variables and the dependent variable. These measures were obtained by subtracting the means of the independent variables and dependent variables from each observation, respectively, and thereafter the appropriate statistical descriptive analyses were performed. Given the utilization of a Likert-scale response type regarding these questions, no extremities occurred, therefore, all 35 data observations were examined.

The data assessments are exhibited via depicted graphs and regressions, as demonstrated in the following two sections. The graphs are utilized in order to display visual analyses, where the regressions are a tool to supply mathematical measure. The generated statistical outputs are presented in the subsequent two sections 4.2.1 Direct Effects and 4.2.2 Intermediary Effects.

4.2.1 Direct Effects

The regression results that do not yield p-values that fall in accordance with significant values of $0 < p < 0.1$ were rejected. Explications concerning lack of significance will be supplied in section 4.3 Implications caused by limitations of the research. Those independent variables not showing immediate direct effects on the dependent variable, mediating, or intermediary, effects were tested for the presence of an influence.

Regressions for direct effects were first generated. Y vs. X was measured, with Y = startup outcome (OUTCOME) against four independent variables: $X_1 = \text{ACCELSIZE}$, $X_2 = \text{NUMEVENTS1}$ (accelerator events), $X_3 = \text{NUMEVENTS2}$ (event resources), and $X_4 = \text{INTLCONNECT}$. The variables to be measured for direct affect and their corresponding tables are illustrated in Figure 15.

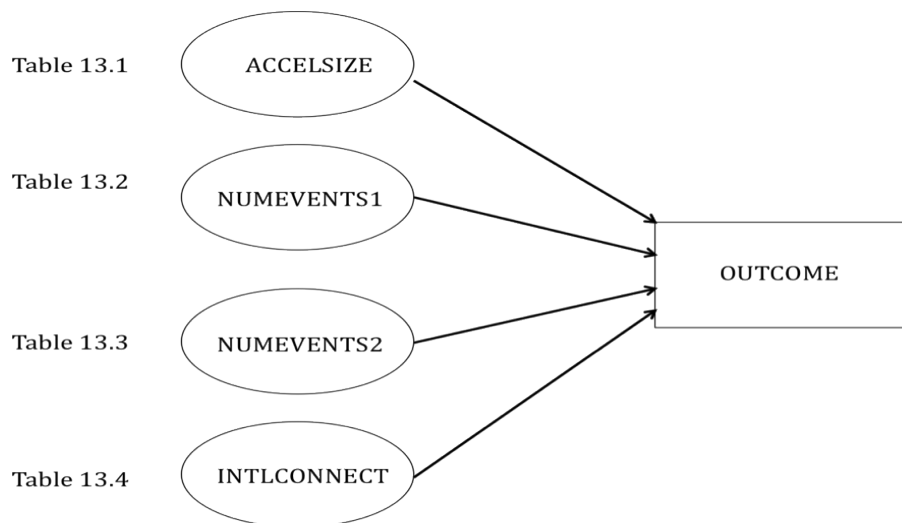


Figure 15. Direct effect regressions model

The second hypothesis is presented here: *a larger network is positively related to the number of startups created*. H2 is tested by the generation of the following Table 13.1.

Table 13.1. Direct effects: startup outcome vs. network actors (Source: sample data)

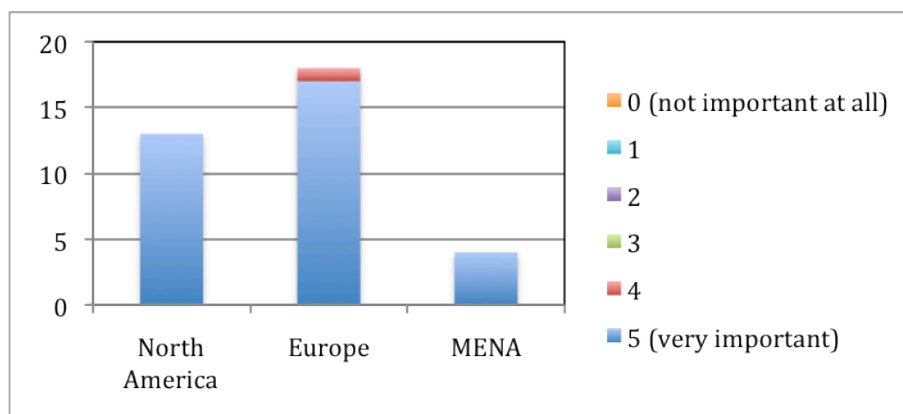
number of observations

=

35

OUTCOME	r	r-squared	standard error	coefficient	intercept	p-value
ACCELSIZE						
mentors	0	0	0	0	0	0
investors	-0.03588550	0.0012877	0.5983169	-0.0856807	-2.0E-16	0.8377679
former startup graduates	0.211102643	0.0445643	0.9404540	0.3206650	-2.4E-16	0.2229866
accelerator members in another state/country	-0.06839529	0.0046779	1.7007783	-0.0574478	-1.7E-16	0.6961006

Former startup graduates is the factor exhibiting the lowest p-value of the accelerator network actors. In addition, as the coefficient is positive, there is a positive correlation of the startup survival rate against the involvement of former graduates. Mentors, investors, and accelerator members in another state or country show a negative correlation with the startup survival rate. However, as none of results for the actors in the network mix yielded a $0 > p > 0.1$, H_2 is rejected. Nevertheless, the regression for mentors, however nearly consistently rated as very important among respondents, displays absolutely no significance. The following vertical bar graph in Figure 16 depicts the frequency distribution attributed by surveyees.

**Figure 16.** Frequency distribution of importance ratings of mentors by region (Source: sample data)

Here, it can be seen that accelerators highly value the presence of mentors in startup foundation and development. 13 out of 13 accelerator respondents in North America, 17 out of 18 respondents in Europe, and 4 out of 4 in MENA characterize mentors as 5 (very important), and 1 out of 18 European accelerator representatives marks mentors as a still important 4.

H1 is presented as follows: *a greater number of events provided by the accelerator is positively related to a lower rate of startup failure*. *H1* is gauged in two parts via NUMEVENTS1 (accelerator events) and NUMEVENTS2 (event resources). Table 13.2 exhibits the regression results of the startup outcome with NUMEVENTS1, and the measurements of the outcome with NUMEVENTS2 are entered into Table 13.3.

Table 13.2. Direct effects: startup outcome vs. accelerator events (Source: sample data)

number of observations = 35

OUTCOME	r	r-squared	standard error	coefficient	intercept	p-value
NUMEVENTS1						
Demo Day	-0.22651143	0.051307432	1.521277659	-0.2013435	-0.35389846	0.19019359
conferences	-0.11545903	0.013330788	1.698120563	-0.091942299	-0.20432900	0.50868702
workshops	0.214034177	0.045810629	1.251385786	0.231285216	-0.20432900	0.216469395
volunteer opportunities	0.055626622	0.003094321	2.005297606	0.037511102	-0.20432900	0.750836162

Demo Day, another variable deemed highly important by respondents, demonstrates the most relevance of the accelerator events variables. Nonetheless, the negative coefficient value appears to denote a negative correlation. This negative relationship is not present on a grand scale, however, as the value of the slope is small. Startup outcome paired against the other events exemplify a positive correlation, and workshops may also have a perceived impact on startup success rate. There is, however, a positive correlation between the startup success rate and workshops, as well as volunteer opportunities.

The frequency distribution is provided Figure 17 to offer a visual perspective of the importance ratings.

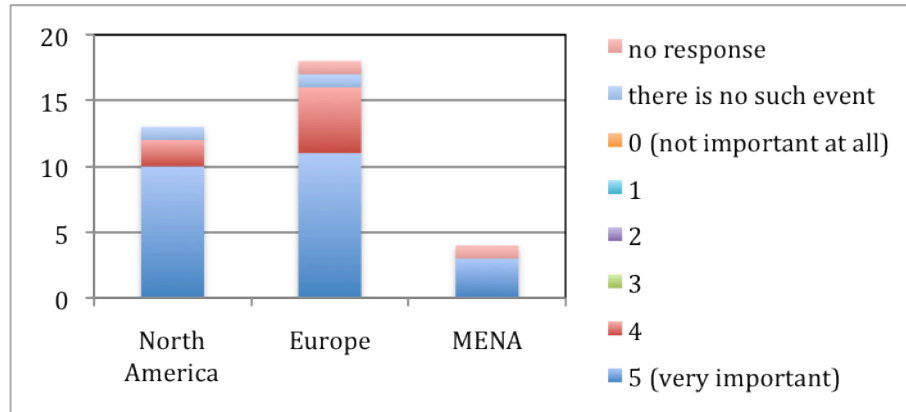


Figure 17. Frequency distribution of importance ratings of Demo Day by region (Source: sample data)

Responses are somewhat skewed, weighing on both ends of the spectrum: of high importance to no response or no event in existence. Nevertheless, the general opinion on the pertinence of Demo Days is recognized: 12 of 13 North American respondents, 16 of 18 European, and 3 of 4 MENA region rate this event 4 or 5 (of high importance).

Additionally, ‘other’ responses noted by respondents regarding the impact of events is the prevalence of more informal gatherings, such as dinners with guest presenters and various informal networking events noted from accelerator surveyees located in North America and private functions, parties, and other exclusive activities mentioned by MENA respondents.

Table 13.3 Direct effects: startup outcome vs. event resources (Source: sample data)

number of observations = 35

OUTCOME	r	r-squared	standard error	coefficient	intercept	p-value
NUMEVENTS2						
Events link to support members	0.251594866	0.063299977	1.343674881	0.253199907	-0.20432900	0.144309309
Events allow to obtain a source of funding	0.191481962	0.036665342	1.596740377	0.162162162	-0.20432900	0.270039231
Events assist in the provision of technical knowledge and other know-how	0.112256402	0.0126015	1.278786189	0.118705036	-0.1842975	0.520596401

From this second table testing *H1*, the significance here lies in events linking to support members, as well as being a meeting place, which allows startups to obtain a source of funding. As the p-value is equal to 0.1, *H1* (NUMEVENTS2) is accepted. Startup outcome shows a positive correlation with these two variables, and the third, that events are an opportunity for new business units to gain technical knowledge and other know-how.

The fourth hypothesis is analyzed in this portion: *more international connections are positively related to startup growth*. The regression results for *H4* are presented in Table 13.4.

Table 13.4. Direct effects: Startup outcome vs. international connections (Source: sample data)

number of observations = 35

OUTCOME	r	r-squared	standard error	coefficient	intercept	p-value
INTLCONNECT	0.181044994	0.03277729	1.537760021	0.15920398	-0.19309107	0.297528134

In this table it is shown that the percentage of international startups shows little significance on startup success. Thus, *H4* is rejected. Additionally, there is a positive correlation between

these two variables, nevertheless, the correlation coefficient denotes a relatively weak correlation between them.

Save for event resources, these tests for direct effect yielded results of low significance, however, some elements noted above are noteworthy. Further regressions will be generated to determine the presence, or lack of, mediating influences among independent variables on the dependent variable.

4.2.2 Intermediary effects

As the direct effects appeared to show little to no significance in regarded to evaluated determinants, the indirect effects of accelerator members were measured with the frequency of network interactions with each respective actor, as well as accelerator events, in order to determine an impact, if any, on the success rate. The means of ACCELSIZE and FREQINTERACTIONS were multiplied together to generate centered variables. OUTCOME was then regressed against this category of variables. The mediating effects method is displayed in Figure 18.



Figure 18. Intermediary effect regressions model

The third hypothesis is examined here: *a higher frequency of network interactions is positively related to the success rate of the startup*. The statistical measures generated to test *H3* are presented in Table 14. FREQINTERACT was measured in conjunction with ACCELSIZE, as each actor contributes his or her respective number of hours of interaction with the startup.

Table 14. Intermediary effects: startup outcome vs. frequency of interactions between network actors and startups (Source: sample data)

number of observations = 35

OUTCOME	r	r-squared	standard error	coefficient	intercept	p-value
FREQINTERACT						
mentors	0.17016450	0.0289559	1.5046147	0.1529324	1.868004	0.3284873
investors	0.16039205	0.0257256	1.2630827	0.1717145	1.362268	0.3569741
former startup graduates	0.25877258	0.0669632	1.1070818	0.3160781	2.097881	0.1328082
accelerator members in another state/country	-0.1645080	0.0270629	1.0010498	-0.2222222	-0.613217	0.3445941

The hours contributed by former startup graduates shows significant influence on startup success than the other actors and their respective interactions, therefore *H4* is accepted. In addition, a higher correlation with the dependent variable is exhibited than when the startup outcome is compared with the other network actors. Accelerator members in another state/country, nonetheless, is the only actor of these four demonstrating a negative correlation with the startup outcome. Explanations of statistical output are discussed further in the following Summary and discussion chapter.

Furthermore, Table 15 is depicted in order to demonstrate a positive correlation with the increasing number of graduated startups over an established period of time of the accelerator.

Table 15. Number of startups created vs. age of the accelerator (Source: sample data)

number of observations = 35

NUMBER OF STARTUPS CREATED	r	r-squared	standard error	coefficient	intercept	p-value
AGE OF ACCELERATOR	0.243088597	0.059092066	2.414330465	0.169537951	-6.818E-17	0.158859656

Lastly, Figure 19 displays some of the elements that accelerator management find are indicators of overall startup success.

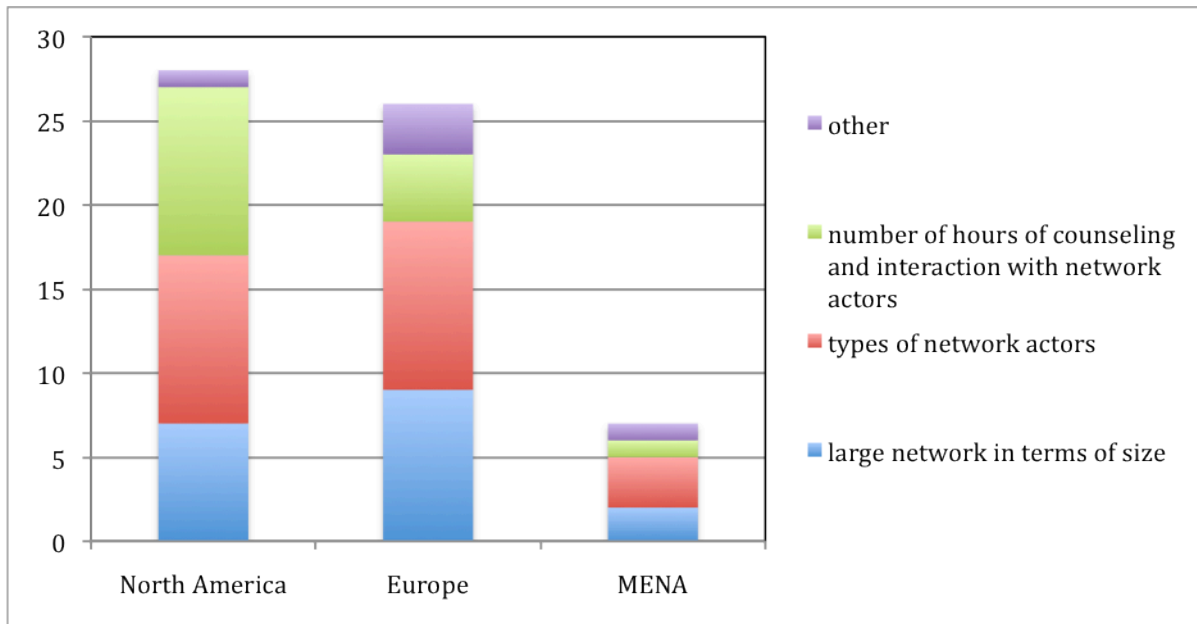


Figure 19. Frequency distribution of networking aspects (Source: sample data)

It is seen here that accelerator representatives in each region have somewhat differing opinions on the networking aspects that have an impact on startup success, keeping in mind that more than one of these four factors could be selected. In the North American region, 10 out of 13 find the mix of network actors and the hours they contribute to counseling as positive indicators towards the startup outcome, while 7 out of 13 find the size of the network as an influential factor, and 1 listed other. Of the European accelerators, 9 out of 18 found the size of the network as an important indicator for the startup, 10 of 18 indicate types of network actors, 4 out of 18 the number of the actors' dedicated hours, and 3 of 18 other. From the MENA region, 2 of 4 find large network sizes influential in the role of startup success, 3 of 4 the types of actors, and 1 of 4 the hours of counseling. 'Other' responses include the balance of customer, product, and pitch development; the involvement and experience of accelerator founders; the quality of the network itself; the startup team; and the execution and commitment of the team.

From this and the results produced in this section, the third objective question presented in section 1.1 Relevance and purpose of the study can be addressed: how do accelerator networks located in the three regions of North America, Europe and the Middle East and

North Africa (MENA) perform when considering network interactions and startup success rates?

Figure 19. Frequency distribution of networking aspects illustrates the notion that accelerators in each region are of the opinion that some interactive networking element has an effect on startup success outcomes. Each of the 35 surveyees noted at least one of the three features, network size, network mix, time quantity allotted by each network actor, or other characteristic as essential to the entrepreneurial result. Moreover, the empirical results providing evidence both favorable as well as unfavorable outcomes are discussed above in Sections 4.2.2 Direct effects and 4.2.. Indirect effects, and are elucidated further within the summary in the subsequent chapter.

Furthermore, as *H1* and *H4* are accepted, the frequency of interactions between former startup graduates and startup teams show a positive influence on startup success. Events as a connection to network actors also demonstrates a significant impact in linking startup teams with a social web in the opinions of startup management in the three regions.

4.3 Implications caused by limitations of the research

The results yielded a superfluous number of high p-values, and there are many possible reasons as to why this may be so. Scheaffer (1999) notes that the sample size has an effect on the analytical outcome, particularly on the statistical significance. The number of observations for this study is relatively low, and may affect analytical output. Additionally, the elements that may influence the reliability and validity factors discussed in the Research methodology chapter may also play on the limitations of this research. Also keeping in mind that participation in a startup does not guarantee success (Tötterman & Stein 2005; Wu 2011) and that survival is difficult to achieve (Carr 2012), the startup outcome may be unpredictable regardless of all the presumed beneficial elements invested in the incubation process. Thus, there may be no variable that can produce a consistent influence towards startup success, or those that are contrived may be subjective.

Furthermore, during the analysis process, no data were manipulated to generate a more favorable p-value than that which resulted. “Other” responses were noted for qualitative

analyses, however, not calculated in the regression and could perhaps be considered in further research exploration. In addition, two questions in particular may have been interpreted ambiguously by respondents, as results were somewhat flippant (noted in the survey attached to the appendix). Therefore, these two questions were discarded from the analysis, and other data relied upon.

This chapter on empirical research and findings delineated the quantitative research method, the regression model and the statistical measurements that explain its significance and influence. The dependent variable OUTCOME was compared to each independent variable ACCELSIZE, FREQINTERACT, NUMEVENTS, and INTLCONNECT. Results tables were generated for each, respectively, showing direct or indirect effects. The next chapter covers the summary and discussion of the findings.

5. DISCUSSION AND CONCLUSION

This summary and conclusion chapter offers generalizations on the applicability of the research findings presented in the last chapter. The summary and key findings are provided, as well as theoretical contributions, the implications of the research, limitations of the study, and suggestions for future research.

5.1 Summary and key findings

Social capital embodies the entire network that is potentially at the disposal of the principal actor, the startup entrepreneur (Bøllingtoft & Ulhøi 2005). This statement was examined in the undertaking of this study. In answering the main research question, the statistical assessments presented in the previous chapter were generated in order to examine the four hypotheses presented in Section 2.5 Framework and hypotheses.

Furthermore, the third objective question was measured in the previous chapter, and the question was posed in the introduction as: How do accelerator networks located in the three regions of North America, Europe and the Middle East and North Africa (MENA) compare when considering network interactions and startup success rates? This issue was addressed in the empirical research, as the regions were the control variable of the study. The results are illustrated in the following Figure 20.

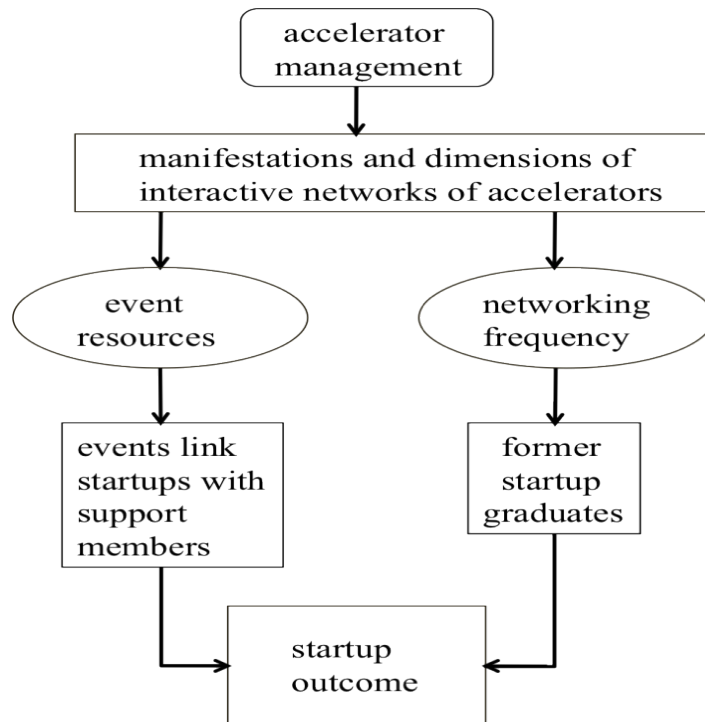


Figure 20. Startup outcome predictors

Though two of the four characteristics (ACCELSIZE and INTLCONNECT) assessed with the startup outcome (OUTCOME) did not demonstrate significance from the results of the regression model output in the ‘traditional sense’, i.e. $0 < p < 0.1$, as a range of acceptability (Scheaffer 1999), two predictor variables (FREQUINTERACT and NUMEVENTS) displayed a degree of impact on the dependent variable. Former startup graduates (ACCELSIZE) and the opportunities of events to link to support members and to obtain a source of funding (NUMEVENTS2) exhibit some extent of impact on the startup success and growth. In this way do accelerators have an impact on the establishment and growth of startups.

In addition, although their respective statistical evidences did not display a significant level or positive correlation, respondents heavily noted the impact of mentors (ACCELSIZE) and Demo Day (NUMEVENTS1) in the nurturing of startups. Thus, these features cannot be disregarded in accelerator research.

Moreover, certain aspects of the social network are noted by accelerator members located in the three regions of focus. The types of actors, the size of the network, the number of

counseling hours contributed by network actors to the startup are all important factors in the development of the new organization. Other notable characteristics, such as the commitment and experience of both accelerator management and startup teams, as well as formal and informal events, are also key to the growth process.

5.2 Implications of the research

The importance of interactive networks on the founding and growth of the accelerated startup cannot be ignored, and individuals embarking on the startup process should be made aware of the advantages accelerator networks provide in order to enhance the entrepreneurs' knowledge, skills, information, resources, and presence (Bøllingtoft & Ulhøi 2005).

Unexpectedly, there is little significance between mentors on the startup survival rate. Moreover, the linear regression for Demo Day as an independent variable results in negative correlation. These two elements are characteristic of the accelerator and startup relationship (Tozzi 2011; Wu 2011; Miller & Bound 2011; Isabelle 2013), and this is evident in the frequency distribution of importance ratings attributed to them and illustrated by their respective bar graphs. However, there does not appear to have been much variation in the responses to generate significance between mentors and startup outcome, though respondents generally feel quite strongly about the importance of this factor on startup success.

Nevertheless, the majority of accelerator personnel note the importance of interactive network actors, such as mentors, and events, such as Demo Day. Perhaps a large mix of accelerator network actors and both formal and informal events can be supplied to the startup teams by the accelerator. Time spent between the network actors and the startup teams can also be enhanced, as well as encouraging the startup to seek international connections and expansion. Incubators and accelerators may choose to institutionalize network structures among incubatees and the incubator's stakeholders, investors, and other network actors. Should a network be formally implemented in an accelerated startup's program lifecycle, the network structure horizon can be broadened, and scalability can be attained as well (Bøllingtoft & Ulhøi 2005; Hansen et al. 2000). These institutionalized elements may include, but are not limited to, an expansive array of network actors, such as mentors and

other individuals under the auspice of the same accelerator in another geographical region, and events, such as demonstration days and workshops.

5.3 Limits of the study

This section covers the applicability of the research findings on a general scale, all the while referring to the scope and limitations of the study. The research parameters centered on accelerators in North America, Europe, and the MENA regions, and while these areas span a large geographical area, the inclusion of other regions may better provide significant research results. Additionally, the presence of a small sample size may have heavily impacted the regression model as well as limited observations among the three regions on a comparative scale. A generally low number of accelerator programs, though prevalence is ever-growing, also affects any statistical analysis, as well as supplying a corresponding lower number of accelerator response rates for this study. Lastly, the study is also conducted from the accelerator point of view, which provides only one-sided opinions on the effects, or lack thereof, of independent variables on the dependent element.

5.4 Future research suggestions:

Further in-depth studies on those factors that showed the most significance from the regression results may be of future academic interest. As explained in the theoretical chapter and additionally evidenced by the contribution of this research, there have been numerous studies conducted on the role of social networks in startup creation and development. However, there has been scarce research on this topic from the point of view of the startup. Moreover, most of the focus has been on the top-down management process and less on the social aspect towards entrepreneurial establishment and growth (Bøllingtoft & Ulhøi 2005). It is also perhaps necessary to conduct research on the long-term outcomes of accelerator services, as the results thus far have been ambiguous and difficult to determine (Wu 2011; Carr 2012).

From the research findings, future exploration may also include more in-depth exploratory analyses on the indirect effect demonstrated by the role of former startup graduates and their

time invested in startup teams towards the growth of the new company. In addition, as a source of direct effect, events may be a point of interest in attaining support growth for startup members.

There are suggestions for more discussion about accelerators in general in academic literature, particularly networked accelerators, as there is already an abundance concerning networked incubators. Other aspects of incubation and acceleration in general, such as knowledge transfer, and expansion on current accelerator topics as the number of accelerators are on the rise (Tozzi 2011). Greater comparison of accelerators among the three and more regions, and accelerator resources and benefits from startup point of view could be examined.

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APPENDIX

Accelerator and networks survey

Q1. Could you please provide the following information?

Accelerator Name:

Date of foundation:

Region of location (North America, Europe or MENA (Middle East or North Africa):

~~Q2. Do you have multiple locations? If so, how many branches are there and where are they located? *~~

	no multiple locations	1-3 locations	4-7 locations	8-10 locations
North America				
Europe				
MENA (Middle East or North America)				
Other (please specify region(s) and how many locations per region):				

Q3. How many startups in total have been established with the accelerator as of today?

__ 0-10

__ 11-20

__ 21-30

__ 31-40

__ 41-50

__ 50+

Q4. What is the approximate rate of startup success and growth?

__ 0-20%

__ 20-40%

__ 40-60%

__ 60-80%

__ 80-100%

Q5. Of the active startups, approximately what percentage are international?

☐ 0-20%
☐ 20-40%
☐ 40-60%
☐ 60-80%
☐ 80-100%

Q6. Which of the following network connections are offered to startups and can you rate its importance?

	There is no network connection between this actor and the startup.	5 (very important)	4	3	2	1	0 (not at all important)	no opinion
mentors								
investors								
former startup graduates								
accelerator members in another state/country								
Other (please specify a network connection and its corresponding importance:								

Q7. For each actor in the network, please specify the approximate number of hours they commit to meeting with the startup during the acceleration period.

	There is no network connection between this actor and the startup.	10-20	20-30	30-40	40+
mentors					
investors					
former startup graduates					
accelerator members in another state/country					
Other (please specify the network actor and corresponding hours committed to startups):					

Q8. Do you organize events for startups whereby network connections can be made? If so, could you rate its importance?

	There are no organized events.	5 (very important)	4	3	2	1	0 (not at all important)	no opinion
Demo Day								
conferences								
workshops								
volunteer opportunities								
Other (please specify an event and its corresponding importance):								

Q9. Could you rank the importance of organized events for the startup?

	5 (very important)	4	3	2	1	0 (not at all important)	no opinion
Events link startup with support members.							
Events allow the startup to obtain a source of funding.							
Events assist in providing the startup with technical knowledge and other know-how.							
Organized events are not very beneficial for the startup. *							

Q10. In your opinion, which of the following may be contributing factors to startup success?

___ large network in terms of size

___ types of network actors

___ number of hours of counseling and interaction with network actors

* omitted for reasons of ambiguous interpretation as noted in Section 4.3 Implications caused by limitations of the research